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THE PHARMACOLOGICAL ACTIONS AND THERAPEUTIC USES OF SOME COMPOUNDS RELATED TO ADRENALINE*

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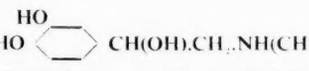
LECTURE I: PHARMACOLOGICAL ACTIONS

Perhaps no single observation in physiology in the last half-century has had a more far-reaching effect on the progress of that science than the discovery by Oliver and Schäfer, in 1894, that an extract of suprarenal gland, injected intravenously, causes a swift and precipitate rise of blood pressure. The subsequent isolation and identification of the active principle responsible for this effect, the gradual elucidation of its manner of action, and, more recently, the discovery of its possible function as a transmitter of certain nervous impulses, have all played a fundamental part in the evolution of physiological and pharmacological concepts. The Oliver-Sharpey Lectureship was founded and endowed by George Oliver, with the expressed intention of "promoting physiological research by observation and experiment and encouraging the application of physiological knowledge to the prevention and cure of disease." He did this in memory of William Sharpey, of whom both he and Schäfer had been pupils in University College, London.

When I was honoured by the invitation to deliver these lectures I thought that it would be appropriate if I discussed some of the cognate work which has followed the pioneer researches of the founder of the lectureship himself, and I deem it all the greater privilege in that I was myself a pupil of Oliver's colleague, Schäfer, who first aroused my interest in this subject.

By 1905 it was established that adrenaline has the structurai formula



the final proof of the correctness of this formula being provided by the synthesis of the compound by Dakin and Stolz. Thus, within about a decade of the discovery of the pressor effect of the extract of suprarenal gland an active principle was isolated from the gland and its exact chemical constitution determined. Though before 1905 the existence of internal secretions of certain glands had been proved by circumstantial evidence, nothing was known in regard to the chemical composition of the active principles responsible for their physiological activities. The constitution of adrenaline showed that, in this case at any rate, the substance was of comparatively simple composition—less complex, for example, than that of most alkaloids. It was the first hormone to be synthesized, and there is no doubt that this rapid success with the chemistry of adrenaline gave an impetus and encouragement to the successful chemical study of other hormones.

The mystery attached to the internal secretions largely disappeared when adrenaline was shown to be a fairly simple body, capable of being manufactured in the laboratory, and the source of which, in the body itself, could at any rate be reasonably conjectured. It was also found that active principles more or less resembling adrenaline in structure and action—for example, tyramine and ephedrine—occurred in plants which have been used for medicinal purposes. This has been an important factor in dispelling the idea of the "unnaturalness" of drug treatment, because substances occur in medicinal plants or can be artificially synthesized which are closely related chemically to a substance which is manufactured in the animal body, and which there exerts effects indistinguishable from those which we usually associate with "drugs."

Method of Action of Adrenaline

The sudden and steep rise of pressure produced by adrenaline was correctly ascribed by Oliver and Schäfer mainly to contraction of the muscle of the arterioles. It was soon found that the smooth muscle of practically every organ was affected by adrenaline. Before that time substances which were known to affect smooth muscles peripherally generally affected them qualitatively in one direction. For example, barium or digitalis produced contraction of all smooth muscle, nitrites produced dilatation. Not unnaturally, therefore, the conception had arisen that any substance that acted on smooth muscle would act either as a universal stimulant or as a universal depressant of this tissue. Adrenaline, however, was different. It had a motor effect on the muscle of some organs—for example, the blood vessels, heart, or spleen—and inhibitor effects on others—for example, the intestine or bronchi. The actions of adrenaline on involuntary muscle seemed to admit of no "classification" according to either the structure or the function of the particular muscle. It seemed entirely arbitrary whether it would produce "stimulation" or "inhibition."

As the result of observations by many workers, notably Lewandowsky and Langley, a remarkable correspondence was shown to exist between the effects produced by stimulation of the post-ganglionic fibres of the sympathetic division of the autonomic nervous system and the actions of adrenaline. This correspondence was clinched by the extensive and definitive experiments of Elliott (1905), who showed that this correspondence held good over a wide range of organs and in many species of animals. An important generalization was now possible, and, though

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differences of opinion still existed as to the precise point at which adrenaline acted, the usual description given was that "adrenaline stimulated the termination of sympathetic nerves" and thus duplicated the effects produced when those nerves were otherwise stimulated—for example, by an electric current. Elliott, in fact, made the brilliant and daring suggestion that, in regard to the correspondence between the actions of adrenaline and sympathetic stimulation, the facts could be explained if it were supposed that a sympathetic nerve impulse acted on the muscle or gland not by a direct physical process but by the liberation, at the termination of the nerve, of a minute quantity of adrenaline. After a lapse of fifteen years the reality of this hypothesis was convincingly proved by Loewi. Evidence from several angles is consistent in suggesting that adrenaline acts on the muscle rather than on the nerve ends. Thus, Loewi and Navratil showed that ergotamine did not prevent the liberation of the accelerator substance when the cardiac sympathetic was stimulated, but it did prevent it from manifesting its action. It had previously been known that degeneration of the sympathetic nerve did not prevent adrenaline from exhibiting its effect. Euler (1938) has recently shown that adrenaline constricts the perfused vessels of the human placenta, which are believed to be free from any nerve supply, and he draws the apparently inevitable conclusion that adrenaline acts on the muscle cell itself. This still leaves the question unanswered as to why adrenaline, acting directly on the muscle, should cause muscle to contract in one case and relax in another.

Dale showed (1906a) that after a suitable dose of ergotoxine a dose of adrenaline which, previously to ergotoxine, had produced its usual pressor effect might now produce a fall of blood pressure. Similarly ergotoxine may "reverse" the action of adrenaline on an exsected tissue—for example, the rabbit's uterus—converting a motor into an inhibitor response. As the most feasible explanation of this phenomenon Dale suggested that the vessels received mixed vasoconstrictor and vasodilator sympathetic fibres, both of which are stimulated by adrenaline; ergotoxine paralyses preferentially the motor fibres and, after its action, adrenaline can stimulate only the inhibitor fibres, hence the reversed effect of adrenaline. This explanation of adrenaline reversal would seem to require modification now that both ergotoxine and adrenaline are believed to act on muscle rather than on nerve ends.

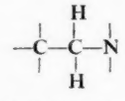
If the action of adrenaline is not on the actual nerve ends, the simplest assumption that can explain its actions seems to be, as Elliott suggested, that there exist myoneural junctions which are distinct from the actual muscle in their reception of chemical stimulants, and that, as Barger and Dale (1910) suggested, "the myoneural junctions concerned with inhibition are not identical, in their affinities for chemical substances, with those which are concerned with motor effects." According to this conception adrenaline acts on both inhibitory and motor myoneural junctions, and as sympathetic stimulation produces both these effects adrenaline and other compounds which act like it can be described as "sympathomimetic." When a compound produces only motor effects on smooth muscle this may mean either that it acts directly on muscle or that it acts preferentially on the motor myoneural junctions. Some of the facts are more readily explicable on the former hypothesis because tissues such as the mammalian intestine, which apparently have little or no motor sympathetic supply, and presumably, therefore, little or no motor myoneural junctions, are nevertheless powerfully stimulated by some compounds of this group.

Perhaps it has been too readily assumed that there is a complete change in the chemical structures of the nerve end, myoneural junction, and muscle. If the interactions between drug and tissue are chemical at all, the "receptor" in the tissue upon which the drug acts must be some definite chemical substance or grouping. Such a chemical substance may not be the exclusive possession of nerve end, myoneural junction, or muscle, but may occur in varying proportions or varying accessibilities in each. If this be the case, then the attempt to classify the actions of compounds related to adrenaline as acting exclusively on one or other of these tissues would break down, as in fact it has done. What mainly concerns us here is to what extent a particular compound deviates from adrenaline in its actions on smooth muscle.

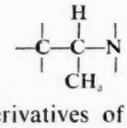
Compounds to be Considered

Once the chemical structure of adrenaline had been revealed attempts were soon made to determine whether the molecule in its entirety was necessary for exerting the particular actions of adrenaline. Much of the ground was cleared by the pioneer work of Barger and Dale (1910), who investigated a large number of synthetic amines, more or less closely related to adrenaline in structure, with a view to determining whether they possessed the "sympathomimetic" actions of adrenaline and what was their relative potency compared with adrenaline itself. Many other investigators have occupied themselves with this problem, and something over two hundred compounds have been investigated having the basic carbon skeleton of adrenaline and differing from one another only in replacement of a hydrogen atom in some part of the molecule by such simple substitutions as an alkyl, hydroxyl, or halogen group. Obviously it would be impossible here to give even a bare mention of all of these.

In such a brief and partial survey as can only be possible here I propose to confine myself to a limited number of compounds (see table) and to certain pharmacological actions only. The selected compounds differ from phenylethylamine, which may be regarded as the basic substance, only in the substitution of hydroxyl, methoxyl, or methyl groups for hydrogen. In regard to the benzene ring only such substitutions are considered when they occur in the 3: or 4: positions—those positions in which the hydroxyl groups occur in adrenaline. Not all the known compounds are included in the table, but most of those mentioned have been used therapeutically. The method of schematic tabulation of the chemical formulae is that used by Gaddum (1939). As the chemical formula of each compound can be derived from the table, their commercial names have been given to facilitate references to their therapeutic uses. The order of substances is arranged on a definite plan. The first nine compounds, which include adrenaline, have a side-chain



—that is, they are derivatives of ethylamine; the remaining compounds have a side-chain



—that is, they are derivatives of isopropylamine. There are certain important pharmacological differences between

the phenylethylamine and phenylisopropylamine compounds, a description of which will be facilitated by this separation of the compounds into the two groups A and B. Group A are further arranged roughly in order of increasing nearness to the constitution of adrenaline, beginning with phenylethylamine and advancing from a compound with no phenolic hydroxyl group to compounds with one and then two such groups. A somewhat similar arrangement is followed in Group B, beginning with isopropylamine. Compounds 3, 15, and 16 are introduced to exemplify the effects of methylation of phenolic hydroxyl groups. In the table is given also (Column VI) the pressor activity of the substances compared with adrenaline, expressed as the reciprocal of the dose required to produce, under similar conditions, a rise of pressure equal to that produced by adrenaline; and (Column VII) the durations of the pressor action of a compound in a dose equipressor with that of adrenaline. These values must be regarded as only approximate, different workers frequently giving different values.

		I	II	III	IV	V	Pressor Activity, Adrenaline = 1 (VI)	Pressor Duration, Adrenaline = 1 (VII)
A	1. β-phenylethylamine (PE)	H	H	H	H	H	1/200–1/80	3–4
	2. Tyramine	OH	H	H	H	H	1/100–1/20	2
	3. *p*-methoxy-PE	OCH_3	H	H	H	H	1/300	4
	4. Sympatol	OH	H	OH	H	CH_3	1/100–1/25	4
	5. Metasympatol	H	OH	OH	H	CH_3	1/5	2
	6. Dihydroxy-PE	OH	OH	H	H	H	1/35	1
	7. Epinine	OH	OH	H	H	CH_3	1/12	2
	8. Arterenol	OH	OH	OH	H	H	3/2	2
	9. Adrenaline	OH	OH	OH	H	CH_3	1	1
B	10. Benzedrine (β-phenylisopropylamine (PI))	H	H	H	CH_3	H	1/300–1/100	5–10
	11. Propadrine	H	H	OH	CH_3	H	1/300–1/60	7
	12. Ephedrine	H	H	OH	CH_3	CH_3	1/300–1/100	7
	13. Veritol	OH	H	H	CH_3	CH_3	1/30	10
	14. Corbasil	OH	OH	OH	CH_3	H	1/4	2
	15. 3-methoxy : 4-hydroxy-PI	OH	OCH_3	H	CH_3	H	1/200	5
	16. Methylenedioxy-PI	O—CH_2—O		H	CH_3	H	1/400	10

The basic substance of this group is phenylethylamine (Compound 1), from which adrenaline (Compound 9) differs in possessing (*a*) a phenolic hydroxyl in the 4 (para) position (I), (*b*) a phenolic hydroxyl in the 3 (meta) position (II), (*c*) an alcoholic hydroxyl in the beta position (III), and (*d*) partial methylation of the amino group (V). Consideration will be confined mainly to the effect on pharmacological action of two factors in chemical constitution: (1) free phenolic hydroxyl groups (I and II), and (2) methylation of the α carbon atom (IV).

Pressor Actions

INFLUENCE OF FREE PHENOLIC HYDROXY GROUPS ON INTENSITY AND DURATION OF PRESSOR ACTION

Barger and Dale found that *p*-hydroxyphenylethylamine (tyramine) has three to five times the pressor activity of phenylethylamine. The effect, however, lasts only about half as long. Dihydroxyphenylethylamine (Compound 6) has a pressor activity probably slightly greater than that of tyramine, but the duration of action is again halved. In other words, with an ethylamine side-chain the result of adding phenolic hydroxy groups is to increase intensity but diminish duration of pressor action. A general survey of the compounds also discloses the fact that, with varying side-chains, the dihydroxy compounds (6, 7, 8, 9, 14) are distinguished by intense but brief pressor action.

What difference, if any, does it make if a single hydroxy group is in the para or the meta position? Barger and Dale found that, with an ethylamine side-chain, the meta and para hydroxy compounds had about equal activity, but Tainter (1932) found that, with a side-chain corresponding to adrenaline, the meta compound (Compound 5) had definitely a more intense but less enduring effect than the para compound (Compound 4). The fact that the effect of a particular substitution may vary with other alterations in the molecule is not an unusual result and makes generalization hazardous outside the particular compounds studied. Nevertheless, from the data given above and from other evidence, it can be concluded that in this series of compounds the probable effect of adding a single hydroxyl group is to increase the intensity and diminish the duration of pressor action, and that these properties are especially manifested if the hydroxyl group is in the meta position, and are still further accentuated if two hydroxyl groups are added in these positions.

One reason, though possibly not the sole reason, for the diminished duration of action resulting from addition of phenolic hydroxyl groups is that this addition makes the compounds less stable—dihydroxy compounds, for example, deteriorating much more rapidly on exposure to light and air or on boiling than similar compounds lacking these groups. One method of rendering such compounds more stable is to methylate the hydroxyl group, and some years ago I got made four compounds—para and meta methoxy-, methylenedioxy-, and dimethoxyphenylethylamines—in the hope that while they might retain some of the intensity of pressor action of the corresponding hydroxy compounds they would exert a more prolonged action. Actually the first three (for example, Compound 3) were found to have the anticipated more prolonged but less intense action than tyramine. On the other hand, the dimethoxy compound, which I expected to be the most active as having methoxyl groups in the same position as the hydroxyl groups in adrenaline, had only a very feeble pressor activity (Epstein, Gunn, and Virden, 1932).

All these compounds (1–9) have (–CH_2–) in the α position in the side-chain (IV). When the structure of ephedrine, a natural alkaloid occurring in certain species of *Ephedra*, was elucidated, it was found to resemble adrenaline fairly closely in structure, differing from it in the possession of a methyl group in the α position and in the absence of phenolic hydroxyl groups. Since its constitution was discovered many other compounds having the α methyl group have been synthesized and investigated, among which are Compounds 10–16.

It can be seen from the table that one effect of the α methyl group is to prolong the duration of the pressor effect, though the intensity is, if anything, diminished. Thus the basic phenylisopropylamine (Compound 10) (benzedrine) has a pressor activity less than phenylethylamine (Compound 1), but the effect lasts twice as long, and Compounds 10–13 all have a relatively prolonged action. One probable reason for those differences in duration of action is the relative ease with which different

compounds are destroyed in the body. Adrenaline is destroyed in the body by an amine oxidase which produces an oxidative deamination of the side-chain (Richter, 1937). By this means adrenaline can be rapidly inactivated, and but for some such mechanism to ensure this rapid inactivation it could scarcely fulfil its possible role as a transmitter of sympathetic nerve impulses. Blaschko, Richter, and Schlossmann (1937) have recently shown that the same oxidase deaminates also phenylethylamine, tyramine, sympatol, and epinine, but has no such action on benzedrine, ephedrine, or corbasil. In other words, it does not oxidize those compounds which have a methyl group in the α position. This affords a reasonable explanation of why the latter compounds produce a more enduring effect, as they will be less readily destroyed in the body; and it also possibly explains the fact that, of all these compounds, those which are especially effective when given by mouth are those having an α methyl group.

When the compound has two phenolic hydroxyl groups and also an α methyl group (Compound 14), the former again increase intensity but diminish duration (compare Compound 14 with Compound 11).

Actions on the Central Nervous System

In contradistinction to its remarkable activity on so many other organs, adrenaline has little action on the central nervous system. Even with fatal doses of adrenaline animals show no symptoms suggesting any important direct effect on the central nervous system, and especially no exaggerated excitability. Bry (1914) found that phenylethylamine produced a marked increase in the respiration rate and short-lasting convulsions, and it was later found that ephedrine, and especially benzedrine, produced a more pronounced stimulation of the central nervous system. In the last few years benzedrine has gained some reputation as a remedy in depressed conditions of the central nervous system and some notoriety as a "brain stimulant" outside medical practice. This has aroused more interest in the central actions of the whole group, and though many of the compounds have not been adequately investigated in this connexion, already certain points seem clear, enabling central stimulation to be correlated with chemical constitution. Some of the more significant findings may be briefly discussed here, and from two aspects: (*a*) changes in the benzene nucleus, and (*b*) changes in the side-chain.

(*a*) The stimulant action exhibited by phenylethylamine is almost lost in tyramine, and is even less manifest in compounds with two phenolic hydroxyl groups (Compounds 7 and 9). Alles (1933) found that, with an isopropylamine side-chain, the presence of one or two phenolic hydroxyl groups reduced the stimulant action of benzedrine. Epstein, Gunn, and Virden (1932) found that, with an ethylamine side-chain, the stimulant action manifested by phenylethylamine and disappearing with tyramine was restored in para and meta methoxy- and methylenedioxy-phenylethylamine but was reduced again in the dimethoxy compound. Hjort (1934), investigating a series of diphenylethylamines, later found that here also "the unsubstituted methoxy and methylenedioxy compounds are invariably excitants and convulsants. The hydroxy substituted members are depressants." There is sufficient unanimity on this point to enable one to say that, so far as the nucleus is concerned, central stimulation of the nervous system is likely to be found in compounds with unsubstituted, methoxy, or methylenedioxy groups and is likely to be absent in compounds with one or two phenolic hydroxyl groups.

(*b*) Alles (1933) found that phenylisopropylamine (benzedrine) is a more powerful stimulant than phenylethylamine, indicating that the isopropylamine is more stimulating than the ethylamine side-chain. Chen and Schmidt (1924) stated that rabbits narcotized by chloral could be easily roused by ephedrine, and that in morphine poisoning it stimulated the respiratory centre. Prinzmetal and Bloomberg (1935) found benzedrine more effective than ephedrine in the treatment of narcolepsy. Gunn, Gurd, and Sachs (1939) showed that methylenedioxyphenylisopropylamine is more stimulant than methylenedioxy-phenylethylamine, and Gurd and I have found more recently that with a cyclohexyl nucleus the isopropylamine compound is again more stimulating than the ethylamine one.

With different types of nucleus, therefore, the addition of an α methyl group confers an increased stimulating property, provided the compound has no free hydroxyl groups. When two of the latter are present (Compound 14) their depressant effect overshadows even the stimulant property of the propylamine side-chain.

Combining (*a*) and (*b*) above, we can therefore, at least as a working hypothesis, assume that the most powerful central stimulants will be found in compounds with an unsubstituted, methoxy, or methylenedioxy ring and an isopropylamine side-chain. Acting on this hypothesis, Gunn, Gurd, and Sachs investigated methylenedioxyphenylisopropylamine (Compound 16) and found that in mice and rabbits it had stimulant properties very like those of benzedrine, from which it differs only in possessing a methylenedioxy group. Under certain circumstances it seemed to be an even more powerful stimulant than benzedrine.

The characteristic stimulation of the central nervous system produced by such compounds is shown by marked acceleration of respiration and a great increase in co-ordinated motor excitability. Animals show, especially with large doses, abnormally rapid and frequent voluntary movements, such as one would expect from a stimulation of the motor cortex. Gurd and I (in unpublished experiments) have recently investigated a new type of compound with a cyclohexenyl nucleus which possesses this action to a remarkable degree. Under its influence mice, especially if several of them are together, dart from side to side of the cage with abnormal speed, knocking one another over, biting and squealing, and displaying a type of motor excitement which is scarcely equalled by benzedrine.

Toxicity

So far no mention has been made of the comparative toxicity of the compounds which have been considered, though naturally this is a question of the first importance. As toxicity differs in different species of animals and varies with the channel of administration, it is difficult to make accurate generalizations. One or two factors which influence toxicity may, however, be mentioned.

Tyramine is much less toxic than phenylethylamine or methoxy-phenylethylamine, and there is a good deal of evidence to show that the presence of a single phenolic hydroxyl group has a pronounced effect in reducing toxicity. Compounds with two such groups are generally more toxic than those with one. Thus adrenaline is at least twenty times as toxic as metasympatol. Adrenaline is in fact the most toxic of all, and this must be partly due to the alcoholic hydroxyl group, for it is very much more toxic than epinine.

Acting on the conclusions previously mentioned in regard to the modifications in intensity and duration of

pressor activity, central stimulant action, and toxicity produced by the introduction of certain groups in the molecule of phenylethylamine, an attempt was made to design a compound with certain definite properties (Compound 15)—namely, a compound which would be more stable and have a more prolonged action than adrenaline or tyramine, but lack the central stimulant action of benzedrine or ephedrine, which is sometimes a disadvantage—for example, from the consequent insomnia. To increase stability and duration of action a methoxyl group was introduced into the nucleus and an α methyl group into the side-chain. To diminish toxicity and central stimulation a para-hydroxyl group was added. The substance was synthesized by Sir Robert Robinson. Actually it was found to have most of the anticipated properties. It had only one-sixth of the toxicity of benzedrine and practically none of the latter's central stimulating action; so that the phenolic hydroxyl group had successfully combated the toxic and stimulant effects of methyl and methoxyl groups. Its pressor effect lasted about five times as long as that of adrenaline and two and a half times that of tyramine, and only slightly less than that of ephedrine. It was, however, only about half as toxic as ephedrine. These results apply only to laboratory animals, and sufficient evidence is not yet at hand to decide whether this compound will display these qualities equally in man. In any case, however, the compound shows that, in a homologous series of drugs, one can, as the result of previous experience, predict the effect of changes in constitution with a reasonable prospect of success.

Actions on Involuntary Muscle other than Cardiovascular

Most workers, following Barger and Dale, have endeavoured to determine whether the compounds they used were sympathomimetic or not, and it has been found that few compounds reproduce the effects of sympathetic stimulation with the completeness and fidelity that are shown by adrenaline. On the other hand, nearly all amines, ranging in constitution between phenylethylamine and adrenaline, agree in exhibiting an action on smooth muscle in relatively low concentrations, regardless of how they may differ otherwise in action—a fact that may be of some biological significance. Barger and Dale found different ratios of motor and inhibitor activity with different compounds, and other workers, using still other compounds, have obtained similar results. If the compounds related to adrenaline could in this connexion be classified into two divisions—(*a*) those which, like adrenaline, are strictly sympathomimetic, and (*b*) those which stimulate all smooth muscle—the problems as to pharmacological classification and therapeutic indications would be simplified; but a survey of these compounds reveals that they do not fall into so simple a classification.

The divergent actions of these compounds can conveniently be illustrated by their effects on the uterus, partly because this organ has been extensively used as a test object of sympathomimetic action. Here not only do the uteri of different species of animals respond differently to adrenaline, but the responses given by compounds related to adrenaline may differ from those given by adrenaline itself. It was shown by Langley (1901) that the uterus of the rabbit reacts to adrenaline by a motor effect whether the uterus was pregnant or non-pregnant. On the other hand, it was shown independently by Cushny (1906), Dale (1906b), and Kehrer (1906) that in the cat, while the pregnant uterus responds, as in the rabbit, by contraction, the non-pregnant uterus is relaxed by adrenaline. Gunn and Gunn (1914) found still another type of innervation in the rat and guinea-pig, for in these animals the uterus is inhibited by adrenaline in both the pregnant and the non-pregnant condition. A comparison of the effects of a compound on the uteri of these animals affords one convenient method of determining whether the compound acts sympathomimetically or directly on the muscle.

Epstein, Gunn, and Virden (1932) found that the para- and meta-methoxy- and methylenedioxy-phenylethylamines inhibited the non-pregnant uterus of the cat like adrenaline, but, unlike adrenaline, contracted the uteri of the rat and guinea-pig. From these and other experiments they concluded that these compounds acted sympathomimetically in cats but not in rodents. Gunn, Gurd, and Sachs (1939) found that phenylisopropylamine and some related compounds produce contractions of the uterus in all animals, including the non-pregnant cat. So far as the uterus is concerned, therefore, these compounds fall into at least three groups: (*a*) those which, like adrenaline, are strictly sympathomimetic; (*b*) those which are sympathomimetic in one species of animal but not in another; and (*c*) those which stimulate uterine muscle universally and with no relation to the quality of sympathetic stimulation. Other workers have found somewhat similar results with other compounds.

If the effect of sympathetic stimulation is to make a muscle contract, then it is from the therapeutic point of view perhaps immaterial whether a compound is sympathomimetic or whether it stimulates muscle directly. If, on the other hand, sympathomimetic stimulation makes a muscle relax, a sympathomimetic compound will have the opposite effect to one which stimulates muscle directly. It is therefore not surprising that much experimentation has been directed to determine whether a compound produces, on smooth muscle in certain organs, those dilator effects that are characteristic of the actions of adrenaline. This is especially important in the search for remedies against asthma. Of the work done in this connexion it is difficult to make any generalizations to which exceptions cannot be found, but one or two points may be mentioned. Barger and Dale concluded, from a study of the compounds available to them, that "of the catechol bases those with a methylamine group, including adrenaline, reproduce inhibitor sympathetic effects more powerfully than motor effects." For example, adrenaline and epinine produce these inhibitor effects better than arterenol. Similarly, ephedrine shows those actions better than benzedrine, which differs from the former in the lack of the methylamino group. In some other compounds, however, the presence of this group seems to be of less importance in conferring inhibitor properties. Another factor which conduces to this inhibitor action is the presence of two hydroxyl groups in the 3:4 positions, but inhibitor properties more limited in degree or extent are found in compounds—for example, ephedrine or tyramine—which lack these groups.

Summary

Even this necessarily superficial and partial survey of the pharmacological actions of some compounds related to adrenaline may give an indication of the possible value of investigations in this field. So far as the problem of relating chemical constitution to pharmacological action is concerned, this group of compounds is an interesting one, partly from its general biological interest as being related to an important hormone and partly because the basic molecule is not too complex, so that such

relations, if they exist, can be more readily established. One action which is retained by compounds based on phenylethylamine, in spite of considerable changes in the molecule, is an action on smooth muscle.

In some cases this can be described as a sympathomimetic action, in others as a direct action on muscle, in others as a mixture of these actions. In virtue of these actions they affect all organs containing smooth muscle—heart, blood vessels, bronchi, intestinal canal, uterus, spleen, etc. They have thus a wide range of activity with potential therapeutic uses. Some of them also stimulate the central nervous system, especially the motor cortex and the respiratory centre. Some examples have been given of how the molecule can be altered to diminish or intensify the various effects of the resulting compounds. The assessment of their therapeutic values, usually a slow process, probably lags behind the pharmacological knowledge we already possess, but some consideration of such therapeutic progress as has been made will be given in the second lecture.

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(The second of the two lectures will appear next week.)

The National Institute of Industrial Psychology (Aldwych House, London, W.C.2) has issued a report on rest-pauses and refreshments in factories. The results are based on information obtained by personal interviews with responsible officials in 1,050 factories, employing about 305,000 workpeople. Equal numbers of factories were visited in seven industrial areas of Great Britain. A wide variety of industries was included, though such non-factory activities as mining, building, transport, shipbuilding, the distributive trades, and offices were omitted. The object of the inquiry was to record the facts of existing practice, and to discuss the views of those who contributed to the inquiry. It was found that 52.9 per cent. of the factories visited made provision for official rest-pauses, either in the morning or afternoon. More than half of the factories visited which have rest-pauses have introduced them during the past decade. In practically all instances official rest-pauses were spent in taking refreshments. Of those employers who gave information relative to the effects of rest-pauses on efficiency 82 per cent. considered that the effects were good, while only 3.4 per cent. regarded the results as unfavourable. Although the primary object of rest-pauses is to reduce fatigue and nervous strain, it appeared that other reasons influenced employers more when introducing rest-pauses. The most important of these reasons were the need of refreshments by those, especially young girls, who had inadequate breakfasts; Factories Act requirements; and the desirability of regularizing unofficial rest-pauses which employers had found to be unsatisfactory.

THE ELECTRO-ENCEPHALOGRAM AS AN AID IN CLINICAL NEUROLOGY

BY

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It has long been known that nervous activity is accompanied by changes of electrical potential. In 1929 Berger, employing thermionic amplification, was able to record from the intact cranium rhythmical electrical changes which he claimed were produced in the cerebral cortex. It was not until 1934, when Adrian and Matthews confirmed this work and introduced important refinements into the technique, that the ground was prepared for further research into the electrical activity of the brain. Since then a considerable amount of experimental work has been done on the action potentials of the exposed cortex of animals. Grey Walter (1936, 1937), employing a modification of the method devised by Adrian and Matthews, studied the electrical changes associated with pathological states of the human brain, and his work in this field has already attained considerable importance.

Evidence exists that numerous electrical rhythms or discharges arise from various areas of the brain and that the type and nature of these rhythms are in some way related to variations in the cyto-architecture. It is not surprising to find, after all the investigations into the electrical nature or accompaniment of the propagation of nervous impulses, that the cell stations in the central nervous system responsible for these impulses do themselves show evidence of electrical flux. It would appear that within the central nervous system there are an infinite number of potential changes—as many changes as there are active neurones; but it is only when certain groups of units, because of a common cyto-architecture, or because of like activity in the physiological sense, act in unison or "beat" together that it is possible to pick up characteristic changes on the surface of the exposed brain. Further complications arise when the electrical changes are studied with the overlying structures intact—that is to say, cerebrospinal fluid, meninges, bone, and superficial tissues. These act as a number of resistances of different values linked in parallel and common to all intracranial electrical events. The effect of the overlying structures is to reduce very considerably the magnitude of the electrical changes which occur—so much so that isolated groups of changes can no longer be picked up, and only the results of mass or "beat" action of a group of events can be detected. The issue is still further complicated because these overlying structures either exhibit or conduct further bio-electric changes—eye movements and action potentials from muscles, such as the temporal muscle, being the most obtrusive. A factor to which too little attention seems to have been paid by some workers in this field is the "noise-signal" ratio of the amplifiers themselves. One sees many records published in which much of what is assumed to be brain activity is in reality a summation of background noise and other unwanted potential changes, with nothing more than an "overlay" of the actual changes. Many of the undesirable effects occur at relatively high frequencies and can be reduced to negligible proportions by the incorporation of suitable filter circuits. These

various considerations must all be taken into account in the design of apparatus.

The basis of this study is a series of observations made in the Nuffield Department of Surgery at Oxford. A room was set aside in the centre of the neurosurgical ward at the Radcliffe Infirmary while the building was still in progress, and was adequately screened. The equipment which we have built (Fig. 1) consists of three

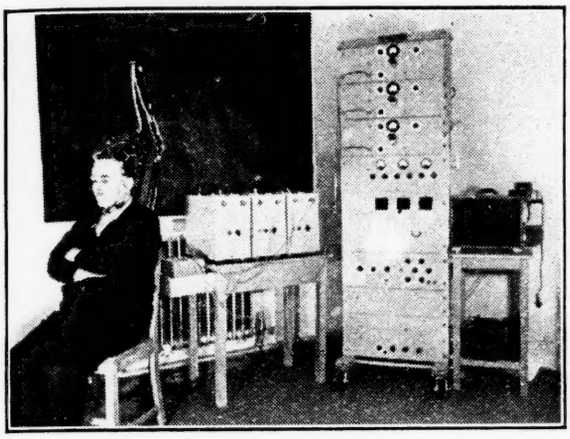

FIG. 1.—Subject with electrodes attached to scalp. In actual practice we have all patients lying either in bed or on a couch; this ensures better relaxation.

separate channels of amplification. The impulses from the patient's skull are picked up by means of "silver–silver chloride" non-polarizing electrodes, and are led off to the pre-amplifiers. The pre-amplifier is a balanced input stage, carefully screened. The tubes chosen for the pre-amplifiers are triodes with a low noise-ratio. The main amplifiers consist of three stages of resistance-capacity-coupled pentodes, the final stage again being a balanced "push-pull." The electrodes are arranged on the skull in pairs, the connexions with the amplifiers being made in such a manner that in the event of any change of electrical potential occurring beneath any one of the electrodes the recording apparatus of the adjacent two amplifiers will be caused to operate in different directions. The electrical events as they are recorded are then said to be out of phase. This is an important principle in determining the localization of abnormal electrical activity within the skull. Fig. 2 will serve further to clarify this point.

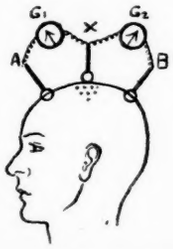

FIG. 2.—A, X, B represent three electrodes placed over the skull. When a change of potential occurs under the centre electrode X the hands of the two galvanometers G_1 and G_2 move in opposite directions as indicated.

The electrical impulses picked up from the brain with the skull and soft tissues *in situ* are very small in most cases, and very high amplification is necessary to record the changes. The amplifiers are designed so as to make possible the recording of changes as small as 2 to 5 μV (1 μV = 1/1,000,000 volt). The amplification is critical and the amplifiers need considerable supervision. For recording purposes we are using three cathode-ray oscillograph tubes with a long after-glow. This allows of constant inspection of the events as they occur, and simultaneous photographic records can also be made.

To show some of the normal findings, and some of the commoner abnormalities associated with intracranial pathology, I propose to take examples from our records and give a brief description of each. In order to keep this paper short and to avoid confusion I shall endeavour, so far as possible, to cite as examples only those cases in which there is some similarity of electrode position over the skull.

Normal Brain Potentials

Fig. 3 is a record for control purposes taken from a normal person with the electrodes in the position indicated in the diagram. In all the records in this paper the

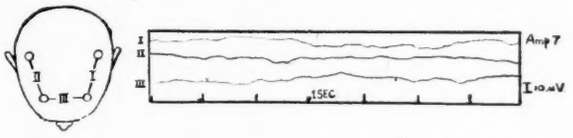

FIG. 3.—O represents an electrode in position on top of the skull. The figures I, II, III indicate the number of the amplifier to which the electrodes are connected. Note that any two amplifiers have one electrode in common.

rate of travel of the film is the same—that is, 2 cm. per second—and in no case is greater amplification employed than in Fig. 3. The amplification factor in each record is indicated in the top right-hand corner of the record. Fig. 4 has been included as a matter of interest as it

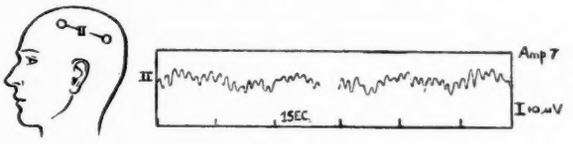

FIG. 4

shows the α or Berger rhythm recorded from a normal subject on a single amplifier. The subject's eyes were closed at the time the record was taken, and one electrode was placed over the occipital region as indicated in the diagram.

Expanding Intracranial Lesions

Fig. 5 gives a record taken from a girl aged 9 who was admitted suffering from headaches and vomiting. On examination she was found to have papilloedema and

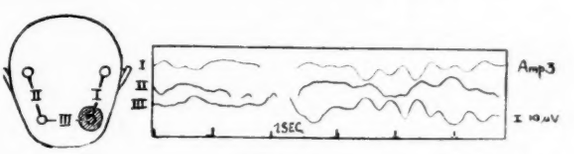

FIG. 5.

a slight sensorimotor hemiplegia down the right side. The record clearly shows the slow slightly irregular discharge of waves at the rate of two to three per second and of great amplitude, even though the amplification employed is much less than in the previous figures. Slow waves not unlike these are found in normal sleep, but in the waking state have only been observed in association with certain pathological conditions. The important feature of this record is the phase relationship of the waves in the different leads. The waves are out of phase between I and III, thus indicating a focus of

electrical disturbance from the region in the left frontal area, as shown in the diagram.

In our experience a discharge of this nature has been found to emanate from the region of a variety of pathological conditions within the brain. However, when, as in this case, there is presumptive evidence of raised intracranial pressure, a focus of this type, localized as it is, can be assumed to be coming from the region of an expanding lesion, and thus is of great value in indicating the exact situation of that lesion. In this particular case it was possible to localize the lesion accurately enough to dispense with ventriculography. At operation a left frontal flap was turned and a large cortical astrocytomatous tumour was found immediately behind the focus of electrical disturbance; this was removed completely. The post-operative course was uneventful.

Fig. 6.—A man aged 52 was admitted complaining of headache, vomiting, and fits. On examination he was found to have papilloedema and some mental deterioration, but no

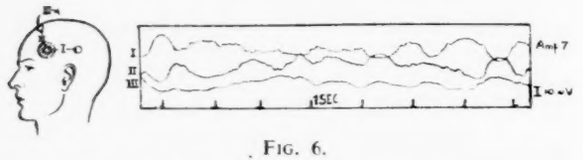

FIG. 6.

localizing signs to indicate the site of the lesion. On the basis of the mental changes and the absence of other signs it was thought that the tumour was frontal, but there was not the slightest clinical indication of its lateralization. The electro-encephalogram showed a slow abnormal delta discharge originating from fairly low down in the left frontal lobe. In the record the large waves out of phase between I and II can be clearly seen. At operation later the site of the lesion was verified; it was a glioma, and was completely removed.

Fig. 7.—A man aged 51 was admitted with fits, headache, and vomiting. On examination he was found to have papilloedema, nominal aphasia, and slight right sensorimotor hemi-

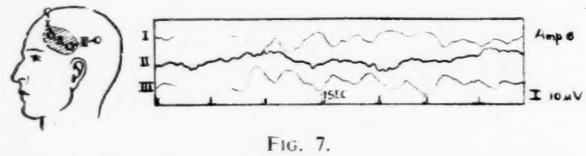

FIG. 7.

plegia. The record shows delta waves of high amplitude, and is of particular interest because the waves are out of phase between amplifiers I and III, thus indicating a lesion of wide area, extending beyond the area encompassed by the leads of amplifier II. The clinical history in this case was short, and suggested a very malignant growth. A burr hole was made over the left frontal region and a small portion of tissue aspirated for histological examination from a depth of 6 cm. This showed the tumour to be a malignant glioblastoma multiforme, and therefore nothing further was done.

Fig. 8.—A young man aged 19 was sent up with a history of scarlet fever five weeks previously. His convalescence had been characterized by headaches; in the fortnight before ad-

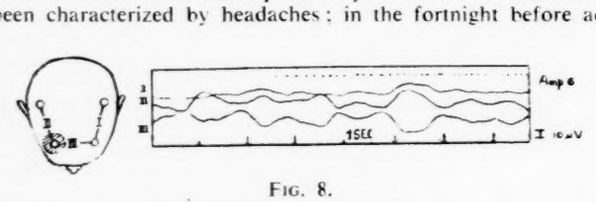

FIG. 8.

mission these had become increasingly severe, and he had become progressively more drowsy. On admission he was difficult to rouse. He had intense bilateral papilloedema. There was very slight left-sided motor weakness, the left abdominal reflexes were absent, and both plantar reflexes were extensor in type. The electro-encephalogram showed a very slow delta discharge of high amplitude, out of phase between amplifiers II and III, thus indicating the site of the disturbance emanating from the right frontal pole. Operation was immediately carried out; a right frontal flap was turned, and an abscess found and aspirated. At a later stage the abscess was removed, and the patient made an uninterrupted recovery.

The Epilepsies

Considerable interest is attached to the study of the epilepsies by this method. This is only natural because of the dramatic electrical changes associated with the actual seizures. Nevertheless it is in the epileptic group that the greatest difficulty occurs in the evaluation of results. It would appear that in many cases of the group known as "idiopathic grand mal" there is constant electrical flux, sometimes generalized and arising from the whole cortex, but very often arising from one or more foci. Such foci frequently occur in the region of one or other frontal adversive field, area 6 $\alpha\beta$ of Vogt, but they are quite commonly post-central or even occipital in origin. In some cases the changes resemble closely those found in association with expanding lesions; in many, however, we have found that the rhythm is slightly faster, with a tendency towards variations in rate and amplitude. In some cases, too, we have found a tendency towards a frequent shift of the focus: sometimes the shift is only one of a few centimetres, but at other times there may be quite a sudden shift of the focus to a corresponding point in the opposite hemisphere. These remarks apply only to those cases of epilepsy in which there is a "resting focus" of electrical flux—that is to say, changes which can be detected between the actual fits. So far as we have been able to judge, these changes, when they are found in a patient, are constant in that individual, and do not bear any time relation to the actual fits. There is, however, evidence that before a fit, perhaps for hours, perhaps for a day or even longer, there is an accession in the electrical changes. On records taken at such times we see what appear to be bursts of waves of increased amplitude and varying rate, not at all unlike the "larval" attacks of petit mal described by Lennox and his associates (Gibbs *et al.*, 1936).

It is necessary to add that there are many cases that clinically appear to be idiopathic grand mal in which we have not been able to detect any abnormality of the electrical rhythm. Why this should be so is difficult to decide at present, but from our experience there seems to be some relation between the resting focus and cortical degeneration.

In another group of cases numerous minor seizures occur. In these there is an almost constant electrical flux with occasional sudden bursts of increased activity which have been described as larval or subclinical seizures, and then again the actual petit mal attacks with even greater alterations of amplitude. Much stress has been laid on the rather constant and characteristic pattern of the wave form in these cases. It is interesting to note that the pyknolepsies are said to fall into this group—with this point of distinction, that the focus of discharge appears to be far back over the occipital region. As the diagnosis of pyknolepsy is difficult until spontaneous recovery has been definitely and permanently established, considerable time will have to elapse before we can assess the full value of such contentions.

It has been claimed that in the so-called traumatic epilepsies there is never any evidence of a resting focus of electrical abnormality. On the whole our experience

supports this, for many cases with fits after a head injury have yielded negative findings on electro-encephalography. These are usually cases without penetrating fracture or other evidence of gross brain damage. There are, however, in our records several cases of gross localized cortical damage in which alterations of potential were observed, in all ways similar to those found with expanding intracranial lesions. In such cases we have assumed an underlying area of gliosis. This aspect of the subject would certainly repay further study.

Fig. 9.—A young man aged 19 was admitted with a history of having had a head injury associated with unconsciousness some seven years previously. About a year after the injury

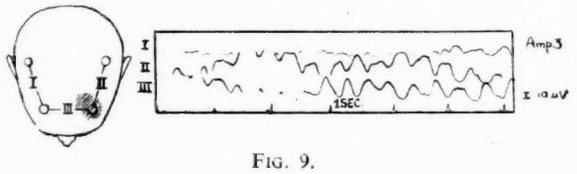

FIG. 9.

he developed fits and continued to have them at intervals, and his case had been diagnosed as traumatic epilepsy. The record clearly demonstrates the large abnormal discharge arising from the region of the left frontal adversive field: the out-of-phase waves between amplifiers II and III indicate the source of origin of the discharge. In view of these findings we are inclined to label this patient as an idiopathic epileptic who would in all probability have developed his fits regardless of the injury.

We have now had the opportunity of examining several patients in whom the onset of fits occurred in later life, from 40 onwards, and in whom the full neurological investigation, including examination of the cerebrospinal fluid, was negative. In such cases one of the chief concerns of the clinician is to rule out the possibility of an expanding lesion, and air studies are often called for. In our series the electro-encephalogram has always been normal when the encephalogram was normal, but further work is necessary before the reliability of the method can be accurately assessed.

Conclusion

From experience to date in the examination of intracranial tumours, although the electro-encephalogram is surprisingly accurate in localization in most cases, we would not like to dispense with the additional help given by ventriculography when operation is contemplated. Information as to the depth of a neoplasm, its absolute size, and its relation to the ventricles, basal ganglia, etc., can only be obtained at present by adequate air studies; and such information is essential in planning the scope of an operation or deciding upon the operability of a tumour.

It is important to emphasize that electro-encephalography by itself is in no way a short cut towards the establishment of the anatomical and pathological diagnosis of intracranial lesions. Like the electrocardiogram, its value is greatest when taken in conjunction with the clinical picture.

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SEA-SICKNESS

BY

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Formerly Honorary Surgeon to the Viceroy of India

I must go down to the seas again,
to the vagrant gypsy life,
To the gull's way and the whale's way,
where the wind's like a whetted knife;
And all I ask is a merry yarn from
a laughing fellow rover,
And quiet sleep and a sweet dream when
the long trick's over.
Sea Fever, by JOHN MASEFIELD.

These lines were intended by the Poet Laureate to describe the feeling of seafaring folk, but they may now be applied to a much wider section of the public, for with the development of holiday cruising a great many business and professional people have learned to love shipboard life and the care-free existence of an ocean voyage.

Certain shipping lines have organized winter cruises as long as I can remember, but during the past few years all steamship companies have developed the idea to meet a new public taste. Formerly cruising liners only catered for the well-to-do; nowadays cruises are arranged to meet all pockets, and thousands of people have experienced the joys of ocean travel who up till recent years would never have dreamed of undertaking a voyage on the high seas. New resorts have been opened up by the cruising ships, and such places as the West Coast of Africa, formerly regarded as the "white man's grave," are now regularly visited by Christmas trippers.

There are, moreover, a growing number of people who have found shipboard life so agreeable that they prefer to spend their lives at sea. "Permanent passengers" of this kind are far from uncommon, and on a recent voyage round the world I met a lady who had spent about five years on the journey backwards and forwards to Australia round the Cape. Each voyage she "signed off," but time after time sailing day found her installed once more in her old quarters. The ship chosen by this lady was not a luxury liner but a moderately comfortable old ship with a purser who loved her and did his utmost to make everyone comfortable.

Among the medical profession there are a good many who suffer from what John Masefield has christened "sea fever." A few general practitioners make the sea their life work, but many act as relief surgeons, and not a few retired medical officers of the fighting services and colonial surgeons have found congenial employment in the service of many of our great companies. Since my own so-called "retirement" I have sailed the seas either as a passenger or as a surgeon every year, and during the past two years I have been to South America, round the world via Australia and South Africa, and across the North Atlantic a dozen times. So many thousands of miles of ocean travel in all sorts of ships have given me a good deal of experience of the distressing condition which is the crumpled rose-leaf in the bed of so many lovers of the sea.

I have been induced to write this article by various medical friends and brother officers who insist that some sort of stocktaking of our present knowledge is needed. There seems to be truth in this, and although a good deal has been written on the subject, when I was going to sea again after a long "shore spell" I found it very difficult to turn up the facts I wanted to know in a single article.

Symptoms of Sea-sickness

Sea-sickness, with its train of unpleasant sensations and physical signs resulting by no means invariably in the final act of vomiting, is the reaction of susceptible individuals to a disturbing and unusual environment. Mark Twain in *Innocents Abroad* says: "We all like to see people

sea-sick when we are not ourselves," and, doubtless with this remark in mind, Surgeon Commander Elder describes the stages of the onset of an attack with good-humoured banter.

"After a period of lively chaff," he says, "the victim suddenly becomes quiet and subdued. As Jerome K. Jerome neatly expresses it, 'he ponders' with a pensive look upon his face. He evinces a strong dislike to the use of tobacco by himself or others; he feels an indefinable something in the epigastrium, is cold and miserable, smiling feebly when spoken to, and apparently wishing to be left alone." The stage of vomiting, when it ocurs, is preceded by profuse reflex salivation. "While in this state, with lips blue, eyes suffused, complexion varied shades of green, and a general disorder of mind, body, and apparel, his condition is one of abject misery, and strongly deserving of sympathy. Then is it his plaint that the ship will not sink, whereas, earlier on, he may have been afraid that she would and drown all on board. The stage of convalescence is generally marked by an air of blatant superiority over his less advanced fellow-sufferers."

This description fails, however, even to mention the symptom "vertigo," which Dr. T. Gwynne Maitland, the medical superintendent of the Cunard White Star Line, declares to be the only one which demands notice in any attempt to understand the essential and underlying features and source of the malady. "The other symptoms—nausea, vomiting, and prostration—are," he says, "common to many ailments but have no special significance other than that they are an expression of an acute perceptuo-emotive experience."

Following the teaching of the latest edition of Osler, Maitland insists that there is no essential difference between the symptoms of sea-sickness and those of air, train, and swing sickness; they are all consequent on some form of passive displacement, and the prominent symptom in all of them is vertigo.

"Passive displacement, called also imposed movement or deposition, is one of the problems connected with the maintenance of equilibrium. The maintenance of equilibrium is a primitive and vital necessity, making possible all purposive activities such as the acquisition of food, the attitude of attack and defence. The specific physiological response of failure is called disorientation; the psychological, vertigo. Vertigo is occasionally found to accompany conditions other than equilibratory dysfunction, such as constitutional, toxic, and traumatic, but its immediate precursor is invariably some interference with the centres controlling equilibrium, however primarily caused."

Maitland concludes that, "though the chief onus of sea-sickness is still borne by the labyrinth, the weight of evidence seems to point to the utricle rather than the semicircular canals as the chief offender."

Aetiological Factors

H. V. Forster, who followed Dr. Maitland in the discussion at the Royal Society of Medicine, analysed the various types of motion which may cause sea-sickness. These may be briefly summarized as:

1. Pitching.
2. Rolling.
3. Corkscrew motion—that is, a combination of pitching, rolling, and yawing.
4. Lurching.
5. Quaking of the ship in her length as she is struck by the seas.

Surgeon Commander Keevil (1935) stated that "sea-sickness is a condition of amphoneurotonia in which parasympatheticotonia predominates." In a later article he (Keevil, 1938) says:

"This generalization was based on observations made on cases in the Service, and can only be considered to apply to sea-sickness among men. In 1936 Hill, writing from a more varied experience in passenger ships, concurred that vagotonia predominates in men, but stated that his cases among women and children were usually sympatheticotonics. He distinguishes the latter from the former type by the presence in women of restlessness and broken sleep, and by the occurrence of nausea before the vomiting, whereas in the vagotonics there was generally no nausea. But, in addition to vomiting, they suffered from drowsiness, apathy, headache, and vertigo. This latter will be at once recognized as the usual service type. In such cases stress was laid on the treatment of this parasympatheticotonia rather than correcting the relative dystonia between parasympathetic and sympathetic, yet it must be apparent that, if the general hypertonia can be neglected, the imbalance of the vegetative nervous system can be equally readjusted by increasing sympathetic tone as by the exhibition of parasympathetic inhibitors."

Elder says that "sea-sickness is the symptomatic reflex result of certain psychical and physical factors acting concertedly in stages of varying individual ascendancy." The former may be summed up in a few words—the influence of suggestion. To certain unfortunate individuals the mere sight of a ship immediately produces nausea. Sometimes vomiting takes place shortly after embarkation while the ship is still made fast to the wharf. Other people are quite well until the ship starts, but become uncomfortable immediately port is left, and remain, if not actually sick, decidedly squeamish for the first few days. Others keep quite well during the early stages of the voyage, but as soon as the ship enters a locality notorious for bad weather, such as the Bay of Biscay, the Great Australian Bight, or the Bay of Bengal, they retire to their staterooms suffering from headache or discomfort, if they are not actually sick. It has been suggested that the movement of the ship on entering these famous bays was "the last straw," but Elder has often satisfied himself by official inquiry of the officer on the bridge at the time that there was actually less motion than hitherto.

Again, the sight and sound of others being sick often induces the process as a sort of sympathetic reflex. Even reference to the old sailor's silly cure for sea-sickness—to swallow a lump of fat pork tied to a string and then pull it up—has been known to produce emesis. The smell of oil, food, and stale vomit generally associated with small cross-Channel packet boats is often enough to bring on nausea, even before the ship has cast off. Elder reminds the ship surgeon that vomiting is a symptom and not a disease. He concludes that with regard to cause the evidence is strongly in favour of it being secondary to some stimulus of cerebral origin. What that central stimulus may be cannot as yet be definitely stated. The majority of observers locate it in the semicircular canals with a disturbance of the equilibration centre. Another theory locates the cause of sea-sickness in the visual centre. This contention was supported by Sydney Scott in the discussion at the Royal Society of Medicine in 1936. "Visual sensation," he said, "evidently plays a part; liability to sea-sickness diminished when the eyes were closed." Dr. Gwynne Maitland, in his reply to the discussion, admitted that visual factors in certain exceptional cases might cause vertigo.

"The passenger susceptible to sea-sickness might develop sea-legs by the end of a trip—for example, to Australia by sea. On disembarking, however, he might show clear evidence of insecurity and might even feel nausea. This, again, is an example of conditioned reflex or habit reaction. His visual sensations ashore betray him, his ocular movements anticipate movement of the solid earth, where none takes place, and his equilibrium consequently breaks down."

Against the visual theory are the well-known facts that attacks of sea-sickness occur in the dark and in the case of blind persons. A third theory locates the seat of trouble primarily in the digestive apparatus. There is little modern support for this notion, though it is true that sufferers from sea-sickness are often the subjects of chronic constipation and persons liable to gastric and intestinal "upsets." One thing is certain, that what is popularly called "biliousness," though not a primary cause,

prolongs and aggravates sea-sickness. Another factor, noted by Dr. Elder as far back as 1908, is the presence of a gynaecological or obstetric element in cases of troublesome vomiting at sea. I had in a recent voyage experience of a case in which the so-called sea-sickness was really the emesis of early pregnancy.

Dr. Elder has attempted to determine whether race has anything to do with the incidence of sickness. His long experience points to Jews, the Southern Irish, and members of the Latin races as the worst sailors. Happily for my seafaring proclivities I hail from Belfast and not from the adjacent Eire!

The average duration of a bout of sea-sickness is three days—which, as every sailor knows, is the average duration of a "spot of bad weather."

Age has considerable influence: children are largely immune, and one of the consolations of advancing years is that the tendency to sea-sickness diminishes. There are, however, certain people even among seafaring folk who never acquire immunity. The captain of the first ship in which I sailed as surgeon was always unhappy in bad weather, and Elder tells us of a shipmate—an officer of twenty-five years' consecutive sea service—who regularly kept his first two or three watches at sea after leaving port with a bucket by his side on the bridge, and was actually sick quite regardless of weather conditions. The only consolation to sailors with this failing is that it is a historical fact that the great Lord Nelson was always sea-sick on returning to the sea.

Several Treatments of Sea-sickness

All these preliminary remarks lead to the important question of treatment. One has only to turn to a recently published book like the *Dictionary of Treatment* to realize that there is no sovereign remedy for the condition. In a brief article no fewer than fourteen drugs are mentioned. One has not to be long at sea to realize that everyone has his own remedy. Byron is, I think, the only English poet who has tuned his lyre to the theme of sea-sickness. In *Don Juan* he tells us that the best of remedies against sea-sickness is a beefsteak.

The scientific general treatment of the complaint falls under five headings:

1. Posture.
2. Warmth.
3. Diet.
4. Beverages.
5. Dextrose.

Posture.—This is about the only point on which there is any sort of general agreement. The best position for the sea-sick man or woman is lying down. Many medical men advise their patients quite indiscriminately to get on deck and lie in their steamer chairs. This advice may be good if the patient has a stuffy inside cabin and if it can be assured that he or she is clad warmly enough and has sufficient rugs. It is quite superfluous in the case of a cabin passenger with a good airy cabin, especially if it is on the promenade deck and has a window instead of a port-hole.

Warmth.—The sea-sick person suffers from a good deal of vasomotor disturbance and always feels cold. I am satisfied that warmth is far more important for most women than fresh air. Men will wrap up when they are confined to a steamer chair, but flimsy silk "undies" and a smart coat are very little protection for female patients against icy Atlantic winds. Fortunately women like hot-water bottles, which can make up for clothing deficiencies.

Diet.—When the patient is in the throes of sea-sickness the mere mention of food leads to an exacerbation of his or her tendency to vomit. As the patient gets better the doctor must try and discover something that is fancied. Starvation will do no harm, but if the passenger fancies any article of diet let him, or her, have it. Cold pork and chutney, or corned beef and pickles, will sometimes stay down when the daintiest sandwiches the pantry can produce are promptly rejected.

Beverages.—Food is *not* necessary but fluid *is*, so as to give the patient "something to be sick with." It is never a mistake to let the patient go without food, but it is always a mistake to let him go without fluid. Withholding food will often prevent vomiting; withholding fluid will only increase the patient's suffering from retching with nothing in the stomach to expel. Every beverage in the barman's store has been lauded by professional or lay advocates. Iced champagne is the most expensive, and in my experience the least effective. Mixed with stout in the form of "black velvet" it rarely fails to aggravate the patient's symptoms. Stout has many admirers, especially among third-class passengers.

I was in charge of women and children on a troop-ship many years ago. The weather from leaving Plymouth until we sighted the north coast of Africa was vile, and the suffering of the women culminated in the collapse of bunks which had been constructed to convert a freighter into a means of carrying human cargo. The women lined up when I visited their quarters and demanded to be put on shore. Kind words and a bottle of stout all round—combined with better weather—induced them to complete the voyage to India quite happily.

Neat brandy or iced dry ginger-ale, or iced water with a few drops of Angostura bitters, are the beverages which have given best results in my experience.

Dextrose.—Before embarking on the administration of drugs the surgeon should remember the usefulness of dextrose in a great many cases. The type of person who is subject to acidosis or ketosis is also liable to travel sickness. In these individuals the carbohydrate-fat metabolism is unbalanced, and there is a need for an easily assimilable carbohydrate that will alleviate their symptoms. Experimental evidence has shown it is a condition of hypochlorhydria in susceptible subjects that produces the sickness mentioned above, which occurs even before the voyage has been started. Now ketosis may be controlled by a regimen consisting of the abolition of fat and the administration of carbohydrate, and it is in such cases that glucose is of value. In my experience persons liable to sickness are benefited by large quantities of dextrose or even ordinary boiled sweets before the commencement of the journey. In many patients with mild symptoms the sucking of barley sugar improves their condition. Dextrose is therefore an extremely useful therapeutic remedy.

Treatment by Drugs

Passing to the consideration of drugs we find that about eight remedies stand out in the treatment of sea-sickness. They are:

1. The bromides.
2. Chloral hydrate.
3. Belladonna, its compounds, and its alkaloid atropine.
4. Chloretone.
5. Hyoscine.
6. Cocaine.
7. Ephedrine.
8. Benzedrine.

The Bromides.—Many years ago Lauder Brunton recommended a drachm of bromide of potassium dissolved in a pint of iced soda-water to be sipped slowly. This drug is the principal ingredient of the well-known proprietary remedy "yanatas." Ship surgeons of my acquaintance rarely prescribed the potassium salt. The slow elimination of bromides is sometimes quoted as a drawback to their use. But in the not infrequent case of sea-sickness where unpleasant after-effects are apt to continue for a time on land this objection may be discounted. Even in protracted sea-sickness it is exceedingly unlikely for bromism to develop.

Chloral Hydrate.—Dr. Hill, with his vast experience as surgeon of the *Aquitania*, recommends the following:

℞	Sodii brom.	ʒj
	Chloral. hydrat.	ʒss
	Sp. chlorof.	q.s.
	Aq. ... ... ad	ʒj

Ft. mist. ʒj every half-hour.

Now chloral hydrate has a twofold objection. First, it is an "irritant to the stomach" (Dilling, 1939). Secondly, it is a depressant to cardiac muscle and to the vasomotor centre. These risks need not be feared, however, as Dr. Hill says that "before there is any possibility of overdosage the patient drops off to sleep and thereby lengthens the interval between doses."

Belladonna, its Compounds, and Atropine.—The employment of belladonna and atropine in sea-sickness is well known to the laity. Most of my patients on an Atlantic luxury liner had provided themselves with pills, tablets, or capsules containing one or other of these powerful drugs. Macaulay (1938) says: "In vagotonic patients belladonna and its alkaloids are invaluable. The tincture (15 or 20 minims in repeated small doses) is more certain in its action and more free from unpleasant after-effects than either atropine or hyoscine alone." The trouble is that a mixture is frequently not retained. In such cases Macaulay suggests that three or four drops of 1 per cent. atropine sulphate placed under the tongue from a pipette may be tried, but surely a hypodermic tablet is easier to administer in a ship's cabin. Twenty drops of genatropine have been suggested, but I have never seen the preparation on board ship. Keevil says that "belladonna has certain disadvantages," which he adds were not overcome, whatever preparation he used. It has a depressing effect and can produce slight mental confusion and impairment of memory; in some cases it is only effective when the toxic dose has been closely approached. He has tried the three proprietary preparations known as "bellafoline," which contains the total alkaloids of belladonna leaves in the form of malates; "belladenal," which is a combination of bellafoline and luminal; and "bellergal," a compound of bellafoline, luminal, and ergotamine tartrate. Keevil (1935) concludes that

"Bellergal would be an ideal drug for sea-sickness were the condition purely one of amphoneurotonia, since the whole of the vegetative nervous system is equally depressed by this preparation. It is certainly of great value in the related condition of migraine, but in sea-sickness, where it leaves unaffected the disturbance of vegetative equilibrium, it has been only partially successful. All three drugs are, however, moderately effective through their vagotropic action, but all suffer from the limitations of belladonna."

Finally there is the new preparation "navigan," which is a combination of syntropan, a synthetic ally of atropine, and a sedative pyridine derivative. Very favourable reports on its use are available, but Keevil has been disappointed by his results.

Chlorbutol or Chloretone.—Described by Bellingham-Smith and Feiling (1931) as "one of the most valuable remedies," it is best administered in 5- to 10-grain cachets. One dose should be taken before embarkation and a second when the patient has settled down on board. I usually give 10 grains, as 5 is often insufficient. The effect of the chloretone may be enhanced by adding 5 grains of benzococaine ethyl *p*-amylobenzoate, which is better known under the trade name "anaesthesine." This drug is recommended to relieve the pain of gastric ulcer. The well-known proprietary remedies "mothersill" and "zotos" contain chloretone.

Hyoscine.—This alkaloid is often preferable to atropine, as it acts as a depressant and not as a stimulant of the cerebral motor area. It diminishes movement and slows respiration, and a full dose produces sleep which lasts from six to eight hours. One-hundredth grain of hyoscine hydrobromide sometimes succeeds when atropine fails. I usually place a hypodermic tablet under the patient's tongue. As a rule this is preferred to a hypodermic injection, and rarely, if ever, increases the sickness.

Cocaine.—Burney Yeo recommends the following draught:

Cocain. hydrochlor.		gr.ss
Chloroform. pur.		♏xx
Tinct. card. co.		ʒj
Aq.	ad	ʒiss

Ft. haustus.

Personally I have always avoided cocaine, as I have had before me the risks of general toxic effects from an idiosyncrasy to the drug. I would strongly advise the ship surgeon to avoid Burney Yeo's draught.

Ephedrine.—Ephedrine was suggested as a remedy for sea-sickness, but John Hill found that it was only useful in prophylaxis combined with atropine. I mention the drug as it was its failure which led Myerson and Ritvo to study the action of benzedrine (which resembles ephedrine in chemical constitution) on the gastro-intestinal tract, but has a dissimilar pharmacology.

Benzedrine.—Up till last year benzedrine, though it originated in Philadelphia, was apparently unknown to my American lay friends as a remedy for sea-sickness. It had not been tried by most of my seafaring medical friends to whom I mentioned it, so it may be of interest to point out that "beta-phenylisopropylamine sulphate," as it is scientifically described, "is a drug with a threefold action." As pointed out above, its therapeutic effects are somewhat similar to ephedrine.

1. It stimulates the central nervous system, including the higher cerebral centres, and has a powerful effect in relieving fatigue, depression, and lethargy. It is well known to pharmaceutical and medical students, who employ it with a view to getting the best out of themselves at examinations, but Dilling considers this use of the drug inadvisable as its cerebral effects vary with individuality.

2. It acts as a pressor to the vasomotor system, but this action is not sustained.

3. It does not affect regular peristalsis, but relieves spasm in the intestinal tract.

Obviously these properties commend the use of the drug in sea-sickness, but equally obviously such a powerful remedy must be used with care. It is contraindicated in excitable persons or in individuals suffering from insomnia. Hyperpiesia or any cardiac trouble and gastric or intestinal atony are equally strong contraindications. Dr. Hill has given the drug with the belladonna group of drugs and with the bromides.

He says, "Coincident vagal activity may be controlled by belladonna or counteracted by the sympathicotropic action of benzedrine." He began with an initial dose of 10 to 20 mg. of benzedrine sulphate. Thereafter "the dosage and intervals should be adjusted to meet the needs of the case. Benzedrine is best omitted in the late afternoon or evening, as its stimulant effect is usually prolonged; even 60 grains of bromide will sometimes fail to prevent insomnia."

Keevil, from very limited use in the Navy, regards benzedrine as a drug of promise, and he discounts the prominence given to the fear that some may learn to partake too freely of benzedrine. In this relation he points out that Guttmann and Sargant (1937) and Wilbur and others (1937) have shown that the ecstasies fade with repetition. It is the unstable neurotics who need to be kept from drugs of addiction. These unfortunates, being at discord with life, crave one thing above all others—oblivion. The fact that benzedrine robs them of sleep will quickly make it unpopular.

My own experiences lead me to support the conclusions arrived at by Dr. John Hill and Surgeon Commander Keevil, and as the drug is American and the tablets are tasteless, which gives it a great advantage over nauseating bitter alkaloids, benzedrine is likely to be added to the medicine chests of Atlantic travellers. In medical hands

it is very useful in those cases which show signs of vagus hyperactivity, but it is a remedy against the promiscuous use of which ship surgeons should be on their guard.

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ACUTE PHLEGMONOUS GASTRITIS IN PREGNANCY

BY

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Acute phlegmonous gastritis, also known as suppurative linitis or as submucous gastritis, is a rare disease, of which only some 200 cases are recorded in the literature, and *none* of these in association with pregnancy. The following case is reported because of the rareness of the occurrence of the condition in pregnancy and because of the difficulty in diagnosis to which the combination may give rise.

Case History

Mrs. A., a 3-para aged 32, had always been in good health, except for occasional attacks of earache, sometimes accompanied by discharge. She had had two previous pregnancies, with normal spontaneous deliveries of live children, weights unknown. There had been no miscarriages. She did not attend any ante-natal clinic.

The patient was admitted on January 27, 1939, with a history of persistent vomiting for the past week. Temperature 97°; pulse 128; blood pressure 120/80. There were signs of extreme dehydration. Her tongue was dry, brown, and furred, and she appeared to have lost weight. The urine had a specific gravity of 1022, was acid, and showed a slight trace of albumin. Acetone and diacetic acid were present, but no blood or bile. The heart and lungs were clinically clear. The abdomen was enlarged to about thirty-two weeks' size, without rigidity or tenderness. The pelvis was not examined. The case was diagnosed as pernicious vomiting of pregnancy.

For the first twenty-four hours she was given plentiful alkaline fluids with glucose by mouth, but no diet. During this time she vomited several times, mostly clear bile-stained fluid. Next day she was much improved: temperature 98°; pulse 110; blood pressure 120/80. A little light diet was ordered, but she did not have any appetite. She vomited once or twice. On January 31 she was still vomiting, and there had been no improvement. She was therefore put on a continuous rectal saline, containing 10 per cent. glucose and in addition pot. brom. 30 grains to each pint. She was also allowed sips of water by mouth. The vomiting became less, and she slept well throughout the night. On February 1 salines were continued. There was no vomit, and her condition had improved. Blood pressure 120/70; pulse 90. The following day a profuse purulent odourless discharge came from the right ear. The patient was seen by the otologist, who diagnosed a chronic streptococcal otitis media. She was therefore immediately transferred to a surgical ward. Her general condition improved whilst away, but she continued to vomit at times. The ear condition cleared up, and she was sent home on February 24.

On February 27 she was readmitted at 10.30 a.m. She was then vomiting copiously, was collapsed, and looked very ill, haunted, and anxious. Her tongue was dry and furred, with sordes on lips and teeth; she had sunken eyes, and was restless, and complained of severe right upper abdominal pain. A slight aural discharge occurred from which a pure culture of a short-chained streptococcus was grown. The vomit was clear bile-stained fluid with no smell. Temperature 101.2°; pulse 140; blood pressure 105/65. On examination she was very tender over the right hypochondrium, especially the gall-bladder area. There was some guarding and rigidity of the upper right rectus muscle. No mass was palpable. At times the uterus appeared to be contracting, but this was difficult to decide because of the extreme tenderness of the abdomen. The foetus was palpable and the foetal heart heard in the R.O.A. position (rate 140). Per rectum the cervix was one finger dilated. There was a slight blood-stained loss per vaginam. The urine was clear except for a slight cloud of albumin: acetone and diacetic acid were present. The stools were normal, and the blood pressure was 100/60.

The differential diagnosis seemed to lie between acute cholecystitis and retroplacental haemorrhage. The height of the fundus was marked, and she was put on a half-hourly pulse and temperature chart. At 12 noon one-quarter grain of morphine was given, and was repeated in half an hour. Alkaline fluids with glucose by mouth were ordered, and continuous intravenous drip saline with 5 per cent. glucose was given into the antecubital vein. At 6 p.m. the fundus of the uterus had risen about two fingers above the level at which it had been marked at midday. The uterus was extremely tender to the touch and was of board-like hardness all over, as was also the whole hypochondrium now from side to side. The foetus was no longer palpable, but the foetal heart could still be heard. The morphine was repeated in the evening and at 11 p.m. The patient slept fairly well throughout the night, but in the morning was still very ill, with a running pulse of 160 to 170. The diagnosis of concealed accidental haemorrhage seemed the most likely one, and the question of Caesarean hysterectomy was considered, but owing to her extremely bad condition it was decided not to open the abdomen.

During the night and from the previous afternoon the patient had had about seven pints of fluid intravenously. About midday she showed signs of cardiac embarrassment and the drip was discontinued. Coramine 2 c.cm. was given, and the pulse steadied and regained volume. Later in the afternoon, at 4 o'clock, she was given 350 c.cm. of blood by the indirect citrate method with the addition of coramine 4 c.cm. Her condition improved. Morphine was repeated. At 11 p.m. her condition was still very grave, and the blood pressure 90/50. 300 c.cm. blood, with coramine, was repeated. The patient did not seem to respond, and she died at 3.30 a.m. on March 1, complaining to the end of acute pain over the stomach. Progressively, the abdomen appeared to become more distended and rigid.

Post-mortem Examination

The uterus and its contents were normal. There was a considerable peritoneal exudate, and in the upper abdomen the peritoneum was deeply congested and coated with flakes of lymph. The peritoneal coat of the stomach was deeply congested and the whole stomach wall swollen and firm. On section the wall of the stomach was increased in thickness to about half an inch, and this change was generalized, although most marked in the region of the pyloric antrum.

The stomach wall was infiltrated with thin pus, which oozed from the cut surface. The duodenum was not involved. The mucosa of the stomach was thick and intensely congested, so that it presented a generalized deep red coloration. The other abdominal organs were normal.

In smears made from the pus from the stomach wall a short-chained Gram-positive streptococcus was demonstrated in large numbers. As mentioned in the clinical history, there was present an otitis media, the discharge from which contained a streptococcus morphologically identical with that found in the stomach wall. Microscopically, section of the stomach showed the muscle coat widely infiltrated with polymorphs, together with fibrin and necrotic tissue; the liver and kidneys revealed post-mortem changes only.

Discussion

The first case of acute phlegmonous gastritis was reported in 1656 by P. Borel, and since then some 215 cases have been made available. Its association with pregnancy is not recorded. The condition is a suppurative cellulitis of the submucosa of the stomach, usually widely diffused but sometimes more or less localized. The causative organisms have been in most cases streptococci, but pneumococcus and colon bacillus have been found. It is thought that in most cases the mode of entry of the organism is through the mucosa of the stomach, either at the edge of a pre-existing ulcer or through some lesion not visible to the naked eye; but in those cases complicating other acute infectious diseases such as typhoid, pneumonia, and puerperal infections the infection may be blood-borne.

In the case here reported the infecting organism was a streptococcus, and from the standpoint of pathogenesis two explanations are forthcoming. The condition may have arisen as a spreading infection from a minute lesion of the gastric mucosa due to the effect of repeated vomiting, which was part of the hyperemesis syndrome. The streptococci must be assumed to have passed from the ear via the Eustachian tube to the mouth and into the stomach. On the other hand, the infection may have been blood-borne, the focus of origin being in the ear, and the localization in the stomach being due to a lowering of local resistance consequent upon excessive vomiting.

The clinical features in the non-pregnant include the rapid onset of severe upper abdominal pain, vomiting, abdominal rigidity, and rapidly progressive prostration due to severe toxaemia. The temperature is raised, the pulse rapid, and signs of dehydration appear. Recovery from such a condition is rare, and in the generalized variety it is unknown. If the condition be localized and an abscess form in the stomach wall, recovery has followed rupture of the abscess into the stomach, and also surgical incision. Diagnosis in the non-pregnant is difficult and has rarely, if ever, been made before exposure of the stomach. The condition closely resembles perforative lesions of the stomach or duodenum, acute pancreatitis, and acute cholecystitis. In the pregnant woman diagnosis is further confused by the presence of the enlarged, hard, tender uterus with its suggestion of concealed accidental haemorrhage.

In the pregnant woman acute abdominal pain, with uterine tenderness and rigidity, vomiting, and increasing prostration, may be associated with a varied underlying pathology, and in our own experience such diverse lesions as acute phlegmonous gastritis, spontaneous rupture of the spleen at term, general peritonitis following suppuration of an ovarian dermoid cyst, spreading peritonitis following perforation of a gangrenous appendicitis, and red degeneration of large fibroid have been met with. In all these conditions there is a peritoneal reaction, the effect of which is to cause abdominal tenderness, which may be impossible to distinguish from uterine tenderness. In addition the uterus in the presence of peritonitis may take on a board-like rigidity indistinguishable from that due to a concealed accidental haemorrhage. This is a most important diagnostic point, since in conditions of peritonitis or severe peritoneal irritation the continued board-like rigidity of the uterus may well lead to a diagnosis of concealed intra-uterine bleeding. This uterine rigidity coincident with peritonitis is not always present, and in some cases the examining hand will detect periodic relaxation of the uterus. In our experience, however, a continued rigidity without any relaxation will often be found in conditions of generalized peritonitis.

In such cases, however, it will be noted that the foetus is still alive, and, although it may not be palpable owing to rigidity, the foetal heart can be well heard—a finding which must throw serious doubt on the diagnosis of concealed accidental bleeding. In peritonitic conditions, except in their terminal stages, the temperature is raised and gross signs of pregnancy toxaemia are absent. In late peritonitis, however, the temperature may be low, the pulse running, and the urine scanty and albuminous.

There is a further feature of interest, and so far as we know not recognized in the literature. In the presence of peritonitis or severe peritoneal irritation not only does the uterus become rigid and tender but the level of the fundus definitely rises in the abdomen. Whether this is due to a straightening out or erection of the uterus coincident with the continued contraction, or whether it is due to a hyperacute hydramnios consequent upon uterine hyperaemia, we have no means of deciding at present. In the case here reported, and in which the initial diagnosis was concealed accidental haemorrhage, the level of the fundus was carefully marked at 12 midday. By 5 p.m. the level had risen one and a half inches. At the time of making the original measurement of the fundus there was not continued uterine rigidity, but five hours later, when the fundus had risen, the uterus was uniformly rigid and tender. We have seen the fundus rise four inches in twelve hours in a case of peritonitis due to a suppurating ovarian dermoid in a pregnancy at thirty-six weeks, and the same sign has been observed in a case of appendicitis with spreading peritonitis.

Cases of pregnancy with associated acute suppurative intra-abdominal lesions are uncommon, and must lead to diagnostic uncertainty. The occurrence of this sign in three instances in our experience suggests that it may be of some use in diagnosing the nature of the causative lesion in these cases, and serves to emphasize the fact that a rigid, tender uterus with a rising fundus does not necessarily point to a diagnosis of concealed accidental bleeding.

The life of the patient may well depend upon avoidance of this mistake, since such a diagnosis leads to conservative treatment and morphine, while suppurative intra-abdominal lesions generally require active treatment and laparotomy.

Summary

A case of acute phlegmonous gastritis associated with pregnancy is placed on record, possibly for the first time.

The clinical features of acute phlegmonous gastritis are described and the difficulty of diagnosis is stressed.

The further difficulty arising when the condition occurs in pregnancy is discussed.

Our thanks are due to Dr. R. C. Macpherson, medical superintendent of St. Mary's Hospital, Portsmouth, for his kindness in permitting us to publish this case.

COBALT AS A FACTOR IN THE CONTROL OF NUTRITIONAL ANAEMIA

BY

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Recent research work conducted by this college has disclosed that a type of nutritional anaemia occurs among ruminants in this country which readily responds to treatment with cobalt salts. Similar forms of anaemia are found in certain areas in Australia and New Zealand, where the exact nature of the disease was first established. In Britain the malady appears to be confined to definite districts, where it exists in an endemic form, but the extent and location of these areas have not yet been fully worked out.

Characteristics of the Anaemia

This anaemia, which is generally called "pine disease," is found both in sheep and in cattle, but is most prevalent among the former. Sheep of all ages and of both sexes contract the disease, but susceptibility is highest among the young. The symptoms include progressive emaciation and physical weakness, loss of appetite, pallor of the visible membranes, and a tendency to constipation. There is usually a reduction in the red cell count and in haemoglobin value, varying with the stage of the disease. Stewart and Piercy (1935) found that the red cell count in a group of affected sheep was 5,770,000 per c.mm. of blood, compared with 10,520,000 in healthy animals. The content of haemoglobin was 6.12 grammes per 100 c.cm. of blood in the pining sheep and 11.43 grammes in the normals. It has been observed, however, that when symptoms first appear pining sheep may sometimes show normal figures for haemoglobin content.

In the Cheviot region of Scotland there exists a tract of land affected with the endemic form of pine disease extending to eighty square miles and carrying a stock of 40,000 sheep. The malady is of long standing, having been in existence for over a century. A description of the disease was published by McGowan and Smith (1922) of this college. In order to keep sheep in health it is customary in the affected region to move flocks regularly to a different soil type once or twice a year. A pining area also occurs on Dartmoor, in Devon, and has recently been described by Patterson (1938).

As a result of a series of experiments carried out in 1935, with which I was associated, it was demonstrated by Greig *et al.* (1938) that the disease can be cured and prevented by the administration of massive doses of iron compounds such as iron ammonium citrate or crude oxide of iron. This method of treatment was thereafter widely adopted in the area, and very effective control was obtained in practice.

Elimination of Iron and Copper as Curative Agents

While in the experiments referred to above there was a considerable response to iron salts, there was no evidence of iron deficiency in the herbage upon which the affected animals were grazing. On the contrary, analyses carried out by Corner and Smith (1938) showed that there was an ample supply of iron. Newly weaned lambs had a daily intake of 36 to 52 mg. Fe, and ewes had a daily consumption of 74 to 90 mg. Fe. As there was a possibility that traces of copper, which were present in the iron compounds, might have been partly responsible for the beneficial results, a dilute solution of copper sulphate, in distilled water, was administered to pining sheep. This treatment, however, had no effect upon the course of the malady. The negative result was confirmed by the fact that the herbage of affected land contained as much copper as the herbage of healthy grazings. There was no significant difference in manganese content. All pastures examined were well supplied with this element.

Attention was directed to the work of Underwood in Western Australia on a nutritional anaemia of cattle and sheep known as enzootic marasmus, which appears to be identical with pine disease in Britain. Underwood (1934) found that sheep and calves which showed well-defined symptoms of the disease, and with a haemoglobin level amounting to only 52 per cent. of the normal, contained nevertheless a much higher concentration of iron in the liver, kidneys, and spleen than healthy animals. The average concentration of iron in the livers of the anaemic sheep was more than five times that of the normal sheep. There was no evidence of excessive red cell destruction to account for the abnormal accumulation of iron in the spleen. It was apparent that the animals had had no difficulty in absorbing ample quantities of iron from their food, but that the utilization of the iron was defective. Underwood concluded that the disease was due to lack of some factor necessary for the metabolism of iron for haemoglobin production.

Filmer and Underwood (1934) prepared an extract of the hydrated oxide of iron, or limonite ($Fe_2O_3H_2O$), commonly used by farmers for treating anaemic sheep. This extract contained no trace of iron, but when administered to affected animals it cured the condition. They subsequently found that the potent element in the extract was cobalt, and the use of this element for the control of the disease proved highly successful. There was a pronounced rise in the percentage of haemoglobin and in the red cell count in the animals treated. Similar results were obtained from the use of cobalt salts in South Australia by Lines (1935) and Marston (1935), and also by Askew and Dixon (1936) in the treatment of bush sickness in New Zealand. Samples of the crude oxide of iron which had been used in the Cheviot region were thereupon analysed for cobalt, and were found to contain over 50 parts per million.

Influence of Cobalt

In 1937 a series of experiments in which cobalt was administered to sheep both for curative and for preventive purposes was carried out by Corner and Smith (1938) on pining land in the Cheviot Hills. In order to exclude any nutritional factor of an extraneous nature the animals were confined on pining land and received no feeding of any description except the natural herbage of the grazing. Cobalt was administered in the form of cobalt chloride (analar) in distilled water. The dosage which had finally to be given to effect a cure was 1 mg. of cobalt daily for fourteen days. Visible improvement was generally noted after ten days, while within three weeks there was a marked recovery in general health. The animals regained their appetites and normal vigour, and thereafter made substantial increases in body weight. They remained in a healthy state for six months without further treatment. Further, it was established in a controlled experiment that the administration of 1 mg. of cobalt daily for fourteen days prevented the occurrence of the disease in healthy sheep for a period of six months on severe pining land.

It was clear, therefore, from these experiments that the beneficial effects previously obtained from the use of iron compounds were mainly due to traces of cobalt in the materials employed. Since these results were established I have successfully treated affected sheep with cobalt in different districts in the South of Scotland. The recovery rate in 129 cases on nine different farms was 97.6 per cent. Two cows affected with the disease were restored to health by giving repeated doses of 5 mg. of cobalt. The use of cobalt for preventive purposes is now widely accepted in practice.

Further Discussion

In all cases the type of nutritional anaemia of ruminants which has been described was formerly dealt with by the administration of iron compounds, but is now effectively controlled by the use of traces of cobalt alone. The presence of cobalt has been demonstrated in significant quantities in practically all substances which have proved

of value in combating the disease. Particulars of some of them are set out hereunder.

	Cobalt, parts per million
Iron ammonium citrate (Filmer and Underwood, 1937)..	16
Iron ammonium citrate (Askew and Dixon, 1936)	24
Ferrous ammonium sulphate, A.R. (Filmer and Underwood, 1937)..	14
Crude oxide of iron (Corner and Smith, 1938)	50

In the Australian investigation it was found that some influence is exerted by traces of nickel: Filmer and Underwood (1937) ascertained that these increased the action of suboptimal doses of cobalt chloride. Orten *et al.* (1933) found that manganese stimulated the haematopoietic action of cobalt in rats. As already noted the herbage on Cheviot grazings appeared to contain no lack of manganese.

While in the Cheviot inquiry there has been a considerable response to cobalt, both as a curative and as a preventive agent, it is possible that the underlying cause of the disease may be found elsewhere than in a deficiency of cobalt. The part played by the various elements which promote the metabolism of iron is imperfectly understood, and it may well be that cobalt has been of value in the present instance because of a breakdown in the metabolism of some other elements concerned in nutrition. Experiments now being conducted here appear to lend support to this view, though further work is needed before definite conclusions can be reached.

Experiments reported by Baxter (1939) suggest that cobalt alone may be comparatively useless as a haematinic in some forms of hypochromic anaemia in man. It is noted, however, that five out of the eight cases treated with cobalt followed or were associated with haemorrhage, and therefore must have had a depleted store of iron in the body, whereas sheep and calves affected with the type of anaemia here discussed have been shown to have excess iron storage. A place for cobalt may yet be found in human cases where a sufficient store of iron already exists in the body, or where cobalt is given in association with iron. References to what appear to be positive results from the use of cobalt have recently been described by Cronin (1939).

Summary

A description is given of a nutritional anaemia of ruminants, known as pine disease, which is prevalent in this country and in other parts of the world.

This anaemia can be cured and prevented by the administration of cobalt salts without the use of iron. The quantity of cobalt required to cure affected sheep is 1 mg. daily for fourteen days. The same treatment acts as a preventive for a period of at least six months.

The disease was formerly controlled by the administration of iron compounds. The presence of cobalt in significant quantities has been demonstrated in these compounds by several workers.

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Clinical Memoranda

Fracture and Dislocation complicating Cardiazol Shock Therapy in Treatment of the Psychoses

The following case is reported because, although there are records of similar ones (Bleuler, 1938), this was the first serious complication of its kind encountered among the ninety cases treated with cardiazol for various psychoses (mostly of the katatonic schizophrenics and the depressed phase of the manic-depressives, but also of other types) in the Southern General Hospital, Glasgow, since July 2, 1937, with the production of approximately 1,600 major epileptiform convulsions.

CASE REPORT

A woman was admitted on December 28, 1938, with the diagnosis of "neurasthenia." She was thin and undernourished, and lay quietly in bed with no complaints of a physical nature. Examination revealed no abnormality in any of the systems beyond a trace of albuminuria, which cleared up within two days of admission and has not since reappeared. Mentally she was a high-grade defective with a schizophrenic psychosis superimposed. Cardiazol shock therapy was begun on January 16, 1939, with an initial intravenous dose of 4 c.cm. of 10 per cent. neutral cardiazol solution and the production of a major convulsion.

During the tonic phase of the second convulsion on January 18 she dislocated her lower jaw; it was easily reduced in the period of relaxation following the clonic phase. Considered with regard to the total number of cases hitherto treated, this complication is comparatively common despite prophylactic measures—it has occurred in ten of the ninety cases—but considered with regard to the total number of convulsions it is rare (occurring in seventeen out of the 1,600 convulsions, and of these seventeen six were in one patient and three in another).

The patient was again convulsed two days later, the improvement seen in her psychotic state following the first injection continuing. She was confused and noisy beyond the ordinary for half an hour after the convulsion and complained of slight pain in both arms three hours later, when the post-convulsive confusion had worn off. She became noisy and restless eleven hours later, complaining of severe pain in the left arm. A dislocation of the head of the right humerus, together with an avulsion of the lesser tubercle of the left humerus, was diagnosed, and confirmed radiologically. The radiograph revealed in addition a linear fracture of the left humerus extending vertically downwards for one and a half inches from the avulsed lesser tubercle. Strong internal rotation of the left humerus was also noted.

Nothing atypical was observed about the convulsion which produced this bony and articular damage, nor was there any modification of the customary injection routine and nursing, which is a slight modification of that originally described by von Meduna (1938). There is no reason to suppose that the above-described lesions were produced other than by the muscle spasm and contractions occurring during the tonic and clonic phases of the convulsive seizure therapeutically induced by the intravenous administration of cardiazol.

I am indebted to Dr. A. D. Briggs, medical superintendent, and to Dr. A. Dick, visiting psychiatrist, Southern General Hospital, for permission to publish this case.

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Reviews

DYSENTERY AND OTHER DIARRHOEAS

The Dysenteric Disorders. The Diagnosis and Treatment of Dysentery, Sprue, Colitis, and Other Diarrhoeas in General Practice. By Philip Manson-Bahr, C.M.G., D.S.O., M.D., D.T.M. & H., F.R.C.P. (Pp. 613; 106 figures; 23 plates, 9 of which are in colour. 25s. net.) London: H. K. Lewis. 1939.

If we regard dysentery as a condition in which there is passage of blood and mucus from the intestine, then the book under review goes far beyond the subject of its title; but the author throughout his years of experience in this and tropical countries has learnt that it is impossible to draw a hard-and-fast line between what is dysentery according to the above definition and those conditions which lead up to it or result from it in which there may be merely diarrhoea or constipation or even normal stools associated with more general constitutional disturbance. Dysentery is thus to be regarded as a collective name for a number of disorders in which the intestinal symptoms may or may not be most prominent at any moment, for the brunt of the attack may fall on any organ of the body. Nevertheless the primary infection or derangement is often intestinal, while in other cases the intestine becomes secondarily involved. It is with this primary or secondary involvement of the intestine that this book deals.

Diagnosis depends on a thorough understanding of the structure and function of the bowel and of the methods of its examination by palpation, test meals, radiography, sigmoidoscopy, and other devices; on complete biochemical, bacteriological, and parasitological study of the faeces; on investigations into the condition of the blood and organs for evidence of infections which may underlie the intestinal complaint; on a careful analysis of the dietetic history for evidence of nutritional deficiencies. It is thus in general terms that a final opinion as to the type of dysentery from which a patient is suffering is arrived at, and it is thus that the author approaches the subject of which he has had such an unrivalled experience.

Bacillary dysentery is the first group of dysenteries to be described, it being now recognized that this type is by far the commonest in tropical countries, where at one time, and especially during the early months of the great war, it was erroneously considered that amoebic dysentery held the field. The epidemic dysentery is nearly always bacillary in nature and in most cases is due to the Shiga or Flexner bacillus. Other possible causes, such as Morgan's bacillus and *Bacillus pyocyaneus*, are discussed, while a special section is devoted to Sonne dysentery. These are exhaustively considered from every aspect—distribution, incidence, pathology, diagnosis, serology, toxins, cytodiagnosis, bacteriophage, treatment—and, making it a special feature of the book, the author draws constantly upon his own extensive records of cases to illustrate his various points. Every type of dysentery and almost all conceivable complications have passed through his hands, so that he is able to write of the bacillary dysenteries, as indeed of nearly all the types of dysentery dealt with in the book, with that confidence engendered by personal experience which brings conviction to readers in search of knowledge.

Amoebiasis, not necessarily amoebic dysentery, is the second large subject which the author handles. This is carried out in the same practical manner as that which distinguishes his treatment of the bacillary dysenteries, and it may be emphasized here that the subject-matter of this and other sections is fully illustrated with drawings, the majority of which have been executed by the author himself. Special mention must be made of the coloured plates, of which there are a considerable number, of the various sigmoidoscopic appearances of the intestine, of the tongue conditions, of the cellular exudates in the faeces, and of the amoebic and other intestinal protozoa. These display an artistic skill of no mean order and greatly enhance the value and attractiveness of the book. Various radiographs illustrate conditions of the intestine, liver, lungs, and other organs.

Following the chapters on amoebiasis are sections dealing with balantidiasis, giardiasis (on which subject a flood of literature has appeared in recent years), flagellate diarrhoea, intestinal coccidiosis, about which very little is known, malarial dysentery, and leishmanial dysentery, a terminal complication of kala-azar. After a chapter on bilharzial dysentery and other helminthic infections liable to cause intestinal upset, the infective diarrhoeas are described as including paratyphoid, food poisoning, and cholera, but not enteric fever itself. Another section is devoted to the steatorrhoeas, particularly sprue, upon which subject much new information has been acquired in recent years at the Hospital for Tropical Diseases in London. This is fully considered from every aspect, the latest and most effective form of treatment being described in considerable detail. Other conditions related to sprue are hill diarrhoea, idiopathic steatorrhoea, coeliac disease, and pancreatogenous steatorrhoea; while to complete the catalogue of subjects mention must be made of mucous and idiopathic ulcerative colitis; mercurial, uraemic, and toxic colitis, including thyrotoxicosis; mushroom poisoning, Henoch's and other forms of purpura, carcinoma of the colon and rectum, polyposis, tuberculosis and syphilis, lymphogranuloma, Crohn's disease, diverticulitis, intussusception, haemorrhoids, and foreign bodies. There are two appendices by the author's technical assistant; the first describes the intestinal protozoa, and the second the laboratory methods employed for the isolation, culture, and identification of pathogenic protozoa and bacteria of the intestine. The book closes with an extensive bibliography and a good index.

Such are the main outlines of a very valuable book, which will undoubtedly be at the right hand of all engaged in tropical practice, who find among the varied assemblage of intestinal complaints which figure in the book their most serious and difficult problems. Here they will receive the guidance of one who has struggled with these problems for many years, who has formed his own opinions, has elaborated his own diagnostic procedures, and has come to some degree of finality regarding the best methods of treatment. Such a book, because of its essentially practical and personal character, is bound to make a wide appeal, and we can safely predict for it a very successful future.

INSULIN SHOCK FOR SCHIZOPHRENIA

The Pharmacological Shock Treatment of Schizophrenia. By Dr. Manfred Sakel. (Pp. 136; 8 figures, 12 curves. 2.75 dollars.) New York: Nervous and Mental Disease Publishing Company. 1938.

This little volume, representing an expansion of the author's original articles and communications to the *Wiener Medizinische Wochenschrift*, gives in convenient form most of what is known about the insulin treatment of schizophrenia. As is well known, Dr. Sakel is the author and discoverer of this new method of treatment

of the most serious of all mental disorders, and is entitled to speak with full authority. When the present reviewer was on a visit to Vienna in the summer of 1934 he was told of the new method, and to his subsequent regret regarded it as such a bizarre idea that he refused to take it seriously. The passage of time and larger experience have compelled him to revise his opinion. Although Dr. Sakel's theories of how the treatment works cannot be taken very seriously, the fact remains that by its means changes in the clinical state, which are positively amazing to the psychiatrist who sees them for the first time, do occur. We are here face to face with one of the most puzzling problems of the psychiatry of to-day; and it seems likely that its solution will mark a very large advance in our understanding of the aetiology and chemical pathology of the endogenous psychoses. Dr. Sakel's book represents a full account of all practical aspects of the subject, and provides a handy manual of the treatment. Interesting clinical illustrations are also described. It is to be recommended to all practitioners who are engaged on this method of treatment, and to the many young psychiatrists who wish to take it up and build their own experience.

VISUAL AND AUDITORY SENSATION

Theories of Sensation. By A. F. Rawdon-Smith. M.A., Ph.D. Cambridge Biological Studies. (Pp. 138; 10s. 6d. net.) Cambridge: The University Press. 1938.

This review of modern research on sensation is restricted to theories of sight and hearing, since, as the author says, the theoretical position regarding the other senses is either hopelessly insecure or entirely absent. The work critically traces the development of our present conceptions of visual and auditory sensation, giving a succinct summary of current views. It will appeal more to the informed than to those unacquainted with the recent trends of investigation on the physiology of eye and ear, but it will have to be read by every one in this field.

The exposition is clear and balanced, if rather condensed and closely reasoned. Two short chapters on the anatomy of the eye and ear might have been omitted, as the matter will be familiar to anyone likely to read the book, and the space used to amplify the more important arguments. Brevity is so rare a quality in biological writings that the author deserves warm congratulations and not censure for giving us so much material in so little space, but the difficulties of the subject are so great that this reviewer at least would have welcomed a little expansion in places.

Among the many important contributions discussed it is appropriate to mention those of Professor Adrian, who with his co-workers has reorientated knowledge in this field, and it is to him that the book is dedicated.

ARTERIOVENOUS ANEURYSM

Arteriovenous Aneurysm. Abnormal Communications between the Arterial and Venous Circulations. By Emile Holman, A.B., B.A., M.D. (Pp. 244; 79 figures, including a frontispiece. 21s. net.) London: The Macmillan Company. 1937.

This book, the elaboration of an essay awarded the Samuel D. Gross Prize by the Philadelphia Academy of Surgery, contains the results of an experimental investigation of peripheral and intracardiac fistulae and many reports of clinical cases of this condition. The subject of arteriovenous fistulae is presented as a physiological problem in the hydrodynamics of the circulation, and a new concept—an increase in the total volume of circulating blood—has been introduced to explain the changes which occur in the cardiovascular system in the presence of an arteriovenous aneurysm. Dr. Holman believes that this explanation may be applicable to the circulatory changes attending congenital cardiac disease and incompetent valves. The first part of the book is concerned with a description of the author's animal experiments in which an increased blood volume was first detected. The author then discusses the development and treatment of congenital and acquired arteriovenous communications in the extremities and head, and finally congenital cardiac disease. The book is well documented.

THE HUMAN BRAIN

Your Brain and its Story. By R. J. A. Berry, M.D., F.R.C.S., F.R.S.Ed. (Pp. 165; 36 figures; frontispiece. 7s. 6d. net.) London: Oxford University Press. 1939.

It is a small book, but into it Dr. Berry has condensed the labours of a lifetime. It is intended for the laity, and therefore simply written; and if the laity take to it, as seems very probable, then a doctor will have to know the latest concerning the human brain if he is to hold his own with his more intelligent patients. An extract or two will serve to illustrate the author's happy style of exposition.

"As an example of the introduction into a neuronic arc of an improper stimulus, that is one to which the receptor neurone is not designed to react, *toothache* may be instanced. The receptor neurones embedded in every tooth are amongst the most sensitive of the body, because they are finally connected up with the great sensitive nerve of the head, the fifth or trigeminal (three-rooted). Normally, we are quite unconscious of the nerves of our teeth and hardly know why they are there. But let a tooth become decayed with an exposure of the hidden nerve and we shall soon know all about it. Under these circumstances the receptor nerve becomes submitted to some entirely improper stimuli."

Or again, to illustrate the origin of the nerve cells of the brain, and incidentally of the sex cells:

"Give a good cook butter, sugar, eggs, and flour, and a variety of pleasing creations will result. So with Nature. With the simple ingredients of the amoeba she turns out a multitude of diverse cells, all admirably adapted to their specialized purpose, and none more so than those marvels of ingenuity, the reproductive cells of the male and female, and the brain cells or neurones of both."

Dr. Berry, it is unnecessary to state, is a Darwinist, but in one respect he must feel envious of pre-Darwinian authors: they had a simple word to cover the living power and process which brought such an organ as the human brain into existence—namely, the Creator. Like most modern writers, Dr. Berry substitutes the term "Nature." "How great a forward leap Nature took when she evolved a rudimentary vertebrate from an earthworm!" he exclaims. Then, again, he speaks of "the beautiful process by which Nature has made the mind of man out of the brains of her lower and lowlier orders of life." In another passage he writes:

"So Nature, in one of her most dramatic moments, introduced into it something entirely new. In place of the single long-axoned internuncial neurone she substituted an enormous number of extremely small and very short ones."

The use of Nature as the *deus ex machina* gives a lively and dramatic quality to Dr. Berry's text, but it does also help him to give readers the impression that we know more than we do. For example:

"In fashioning the brain of Man from her age-long trials and errors, Nature simply repeats—but this time in combination—the old well-tried formulae of spinal cord (intersegmental) and cerebellum (supra-segmental) neuronic arcs.

The only appreciable difference is that . . . there are provided for the new brain of Man not thousands of neurones but thousands of millions."

Just one last quotation to show that even if Dr. Berry is somewhat free in his appeals to Nature he is at heart a very sound neurologist. "To deny to-day that the individual's manifestations of mind are the product of brain-cells is as foolish as it is out of date."

A. K.

MORBID HISTOLOGY

Pathologische Histologie. Ein Unterrichtskurs für Studierende und Ärzte. By Dr. Max Borst. Third edition. (Pp. 522; 361 figures, many of which are coloured. RM. 75; bound, RM. 78.) Berlin: Julius Springer. 1938.

There are few textbooks dealing solely with morbid histology. The first was Julius Vogel's *Icones Histologicae Pathologicae* (1843), and a number appeared in the last century, of which Rindfleisch's (1870) is the most famous. In this century those that come to mind are Aschoff and Gaylord's atlas with its magnificent photomicrographs, the excellent *Principles of Pathologic Histology* of Mallory, Donaldson's *Practical Morbid Histology*, and the most useful little *Elementary Pathological Histology* of Barnard. The reason is not hard to find. Morbid histology is dealt with in all textbooks of pathology, and unless the scope is purposefully limited, as it was in Barnard's handbook, the cost of production of an adequate atlas to cover all fields of the subject would be greater than its usefulness warrants.

It cannot be said that Professor Borst's textbook really justifies its cost (approximately £5 at present exchange values). It has numerous beautiful coloured illustrations, but they are almost all from haematoxylin-eosin sections, and the text shows a similar lack of recognition of the advances of normal and morbid histological approach. It is true that staining technique has tended to obscure the older methods, such as vascular injection and the examination of fresh unstained material, and Professor Borst stresses these methods, but one would expect an account of the morphological changes of the neuroglia, pituitary, and the intestinal mucosa in a textbook of morbid histology. The section on tumours is equally disappointing; there is no description of the glomus tumour, lympho-epithelioma, or adenolymphoma. The classification of the gliomata is archaic, there is no mention of "grading," and the account of bone tumours is inadequate. The book can only be described as an expensive anachronism.

Notes on Books

For its eighteenth year *L'Année Médicale Pratique* made its punctual spring appearance under the skilful editorship of Professor CAMILLE LIAN. The publisher is René Lépine and the price 36 francs. From "accidents du travail" to "zona ophtalmique" over five hundred pages of text are packed with practical information in which details of treatment receive particular attention. For some years a "spoken edition" of this annual has been presented, so to speak, in the shape of a week's revision course in Paris, at which the various authors take part and give a lecture-demonstration on the recent advances in their subject. This happy arrangement keeps the written word fresh and free from superfluities. It is, moreover, a style of presentation which suits the French medical world. Other features of this annual include a list of the chief proprietary preparations issued during the year, with brief therapeutic notes. The indexing is of a high standard, and helps to make the volume especially useful. Perhaps, now that the annual is reaching its majority, a new preface might be prepared: Professor Emile Sergent's chatty note—"vous m'avez demandé, mon cher Lian," etc.—seems less bright as the years pass by.

The fifth edition of Part I and the seventh edition of Part II of the *English–German and German–English Medical Dictionary* are published by Franz Deuticke, Vienna. Dr. Springer has improved upon the fourth edition published in 1935 (English–German), and has brought the dictionary up to date, omitting some of the unused English words and substituting for them those more current in the English language. Both parts are concise and should prove useful to both English and German medical practitioners. The price of Part I is RM. 6 and of Part II RM. 7.

The latest contribution to the French series which deals in epigrams is by Professor ROBERT DEBRÉ and concerns *Quelques Vérités Premières (ou soi-disant telles) sur les Maladies des Enfants*, a title which is not easily translatable. No better authority could have been found to tackle the subject of paediatrics in this series, and granted the inherent difficulty of the task of being epigrammatic for nearly one hundred pages the volume may be accounted a success. It is published at 28 francs by Masson of Paris.

Preparations and Appliances

A SILENT SUCKER

Mr. A. SIMPSON-SMITH, M.Ch., F.R.C.S., writes:

The disturbing hiss of an "idle" sucker is eliminated in the present pistol-grip model, which works only when the

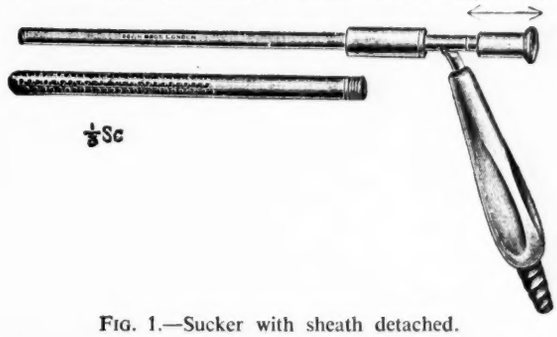

FIG. 1.—Sucker with sheath detached.

plunger is pressed with the thumb. The instrument lies noiselessly on the operating table when not in use, and even when in action it can be made soundless by inserting the sucker into pus before pressing the lever.

The perforations in the outer sheath enable thick pus or blood clot to be sucked away quite readily, and during the past ten years I have found no better end-piece, at home,

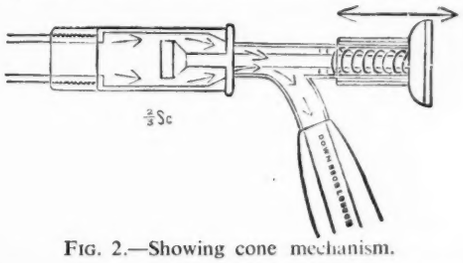

FIG. 2.—Showing cone mechanism.

in Europe, or in North America. The sheath can be unscrewed and the central shaft used for fine suction, as in cleft palates. The simple cone mechanism of the stopper avoids clogging, and as the vacuum assists the "closing" of the spring this latter should last indefinitely.

My thanks are due to Mr. Tom Rowlands and to the makers, Messrs. Down Bros., for their helpful advice.

SOCIAL HYGIENE CONGRESS

A comprehensive programme was provided by the British Social Hygiene Council for the ninth Imperial Social Hygiene Congress, which was held at the British Medical Association House in London from July 10 to 14. More than 150 delegates attended, including Government and Colonial officials, social welfare experts, teachers, and nurses, and the representatives of twenty-seven local authorities. The subjects for discussion at the various sessions, some of which took place simultaneously, included family and social hygiene, the population question, medical and social co-operation, the teaching of biology as a factor in health and character training, and the various technical, medical, and administrative aspects of venereal disease. A whole-day conference was held on oversea nursing, the subjects including the training of the indigenous nurse over-seas, and the training of nurses in this country for oversea service.

The Congress was formally opened with a few words of commendation by Earl DE LA WARR, President of the Board of Education, and this was followed by messages from the High Commissioners for India and the Dominions. Mr. L. S. AMERY, M.P., the President of the Congress, in his address from the chair, surveyed the progress in social hygiene during the two-years interval since the last Congress, and spoke of the importance of a healthy social life from the point of view of defence.

Medical and Social Co-operation

In a session over which Dr. OTTO MAY presided, the subject of medical and social co-operation was opened by Dr. LETITIA FAIRFIELD. She referred to the fact that there were nearly 50,000 new cases of venereal disease in 1938, every one of which, she said, was preventable. The explanation why they were not prevented might lie in the fact that there were only three whole-time and twelve part-time venereal diseases almoners in Great Britain, and only one of these was employed outside London. It was futile to put forward any scheme for dealing with venereal diseases which did not include a trained social service. The time was long since passed when an almoner might be considered an "extra" in the clinic staff. If the anti-venereal campaign was to be taken seriously no clinic should be considered efficient which did not possess such an officer. She thought it regrettable that the male almoner had not yet materialized, for there seemed to be undoubted scope for his services among young male patients.

Dr. Fairfield also pointed out that the inauguration of the militia through which every young man in the country would pass at the age of 20 gave an excellent opportunity for a universal educational campaign which would in time cover men of every class. Another factor revolutionizing the position was the discovery of the sulphanilamide preparations. Even the most conservative critic could not deny the dramatic change that had been wrought in the treatment of gonorrhoea. The trouble was that the whole business might now appear so simple that the infected person would be tempted to try self-treatment, and might ignore the warning that recurrence was very possible after an initial improvement. Two outstanding medico-social problems had made little recent progress—namely, the high incidence of untreated gonorrhoea among women, and the rehabilitation of the regular prostitute.

A contribution was made to the same discussion by Mlle MARIE DE STELLER of the Social Section of the League of Nations, who described an inquiry recently made by the Traffic in Women and Children Committee of the League into the rehabilitation of adult prostitutes. She mentioned two examples of institutional treatment, one highly successful in Soviet Russia, and the other less successful in Estonia. In the Russian system rehabilitation was always combined with treatment of venereal disease. The labour prophylactoria were free institutions into which prostitutes found their way by various paths, and where it was part of the rehabilitation treatment to make the women acquire the habit of working. There was no social prejudice against former prostitutes in Russia, and it was not difficult to find work for them at the end of their treatment.

In a further session, presided over by Sir Arthur MacNalty, Colonel L. W. HARRISON gave a review of the position in this country in respect of the control and treatment of syphilis and gonorrhoea, and a particularized account of the Edinburgh venereal disease scheme in action was given by Dr. R. C. L. BATCHELOR, the clinical medical officer of Edinburgh Corporation. The scheme, he said, provided venereal disease treatment facilities and also an efficient social service for Edinburgh and South-Eastern Scotland. The completeness of treatment facilities was secured by the provision of a large out-patient department at the central clinic, together with subsidiary clinics: in-patient accommodation to the number of thirty-eight beds; the establishment of venereal diseases sections with out-patient clinics and in-patient beds in the ante-natal departments of the maternity hospitals; bed and cot accommodation for special cases; and a seamen's dispensary at the docks. The weak part of the scheme was the lack of a hostel for infected girls, but modern chemotherapy was now clearing up infections so rapidly that it was more practicable to admit girls to hospital for in-patient treatment during the early infectious stages of the disease. Chemotherapy often brought about a clinical cure of gonorrhoea within a week; the arsenobenzol and bismuth treatment could rapidly ensure the non-activity of syphilitic lesions, and so the chance of transmission of these diseases was minimized by a comparatively short stay in hospital.

Population Problems

Many papers were devoted to wider aspects of social problems. Mr. KENNETH WHITE and Miss GRACE LEYBOURNE, in a joint paper, pointed to the rapid contraction in the size of families during the last sixty years. The average number of children born to a woman had fallen from 4.78 to 1.79. Even more startling changes were apparent if one reckoned the average number of future mothers born to a mother to-day. In North-Western Europe the rate had everywhere fallen to below 1, except in Holland and Eire; in South-Western Europe, apart from France, it was still above unity, but in general the rate seemed to be falling throughout Europe, and there was no sign of approaching stabilization in any country. The authors of this paper saw no permanent solution in a policy designed merely to promote more and earlier marriage, but it might prove more effective if combined with other social policies—crèches and nursery schools to give women freedom from domestic ties while they pursued other activities and professions, the provision of housing accommodation adapted to the needs of moderately sized families, and the making of higher education more accessible to meagre purses.

Miss ELEANOR RATHBONE, M.P., advocated direct provision for dependent families through family allowance schemes, a subject which was well ventilated at the recent Nutrition Conference of the B.M.A. At another session, which concerned itself with the social and economic barriers to marriage, and was presided over by Lord HORDER, an animated discussion was opened by Mr. R. H. PEAR of the Eugenics Society, who declared that the population would in a few years begin to decline in numbers, owing to the number of deaths exceeding the number of births, the most important reason being the modern habit of small families, which was spreading and did not seem likely to lose its popularity in the future. One point on which economists were in agreement was that any diminution in the size of the population, far from curing unemployment, was likely to leave it as chronic as before. At best we could look forward to a relative decrease in the number of active producers; at worst we might foresee the gradual disappearance of our race from this part of the globe.

The final session was presided over by Sir WALTER LANGDON-BROWN, and an address on social service in the anti-venereal campaign was given by Dr. CAVAILLON, inspector-general of the French Ministry of Public Health.

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SOME PROBLEMS OF GASTRIC SECRETION

The main facts about the control of gastric secretion were discovered by Pavlov some forty years ago; the present state of knowledge is well summarized by Ihre.[1] Pavlov demonstrated that the presence of food in the mouth, reflexly through the vagus nerves, elicited a secretion of gastric juice (appetite or psychic juice), rich both in pepsin and in hydrochloric acid and containing dissolved and visible mucus. The sight or smell of food does not arouse a secretion in quite young animals; as these stimuli are, however, regularly associated with the actual ingestion of food they acquire in the course of time the power of setting up a secretion even when not followed by feeding. "Psychic" juice is, therefore, usually the resultant of both inborn and conditioned reflexes. Gastric acidity is also controlled from the middle group of hypothalamic nuclei which regulate the parasympathetic division of the autonomic nervous system. Stimulation of these nuclei leads to changes in intragastric pressure and to increased flow of gastric juice. Experimental lesions in this region of the nervous system may be associated with the development of haemorrhagic erosions of the gastric mucosa or even the formation of acute perforating ulcers; but recent reports[2] indicate that these consequences are by no means invariable. Since Cushing drew general attention to the subject the clinician has diligently looked for nervous causes of human gastric ulceration. In twenty-two cases recently described,[3] in which erosion or ulceration of the oesophagus, stomach, or duodenum occurred just before death, lesions of a diverse character were found in the brain in twenty-one, and in sixteen of these the hypothalamus was involved. Evidence[4] has been presented that a certain type of personality and emotional disturbances of various sorts may be important factors in the development of chronic gastric ulcer. The general theory would be that vagus overaction somehow induces ulceration, though the exact mechanism is left undefined. It is well known that vagus stimulation produces intense vasodilatation in the gastric mucosa, which flushes a bright rose colour; simple ischaemia can therefore be excluded as a causal agent in this type of ulceration. It may be, however, that the congestion becomes so intense as to induce circulatory stasis or haemorrhage; this may impair the nutrition of certain parts of the mucosa, which may then succumb to the powerful digestive action of the highly acid gastric juice.

It has been now established[5,6] that the injection of insulin (12–20 units in man), after a latent period of forty-five to sixty minutes, is followed by flow of gastric juice; the secretion may be increased by as much as 100–200 c.cm. and the composition of the fluid resembles that produced by stimulation of the vagus. The gastric response is associated with the usual signs of mild insulin poisoning, including a fall of the blood sugar to about 70 mg. per 100 c.cm. of blood. The hypoglycaemia, and not the insulin, is the secretagogue, as the gastric response is annulled when glucose is given with the insulin. In severe diabetic subjects even large doses of insulin fail to stimulate gastric secretion unless the blood sugar is reduced to a subnormal level. Appropriate cross-circulation experiments have shown that hypoglycaemia acts on the central nervous system and causes increased activity of the vagus fibres to the stomach. The gastric response to hypoglycaemia is abolished, as might be expected, by double vagotomy in animals, or by suitable doses of atropine in man. The hypoglycaemic test seems to deserve more extensive clinical trial, as of all the methods of investigation in current use it is the only one which depends on the integrity of the nervous pathways to the stomach. The intravenous injection of a number of amino-acids (for example, glycine, alanine, glutamic acid) also provokes gastric secretion[5]; these substances also stimulate the centres in the brain either directly or by means of the hypoglycaemia which they commonly induce. It is improbable that hypoglycaemia is a normal mechanism regulating gastric secretion because the requisite low level of blood sugar is seldom reached in health. It may, however, be observed that peptic ulcer is rarely found in association with diabetes mellitus. Stimulation of the splanchnic sympathetic nerves[7] leads to the steady secretion of a fluid rich in mucus, alkaline or acid in reaction, and poor in chloride and pepsin content. The secretion comes mainly from the pylorus, and, according to Babkin, is formed chiefly by the cells lining the long necks of the glands in that neighbourhood.

[1] *Acta med. scand., Suppl.*, 1938, **95**.
[2] *Amer. J. Physiol.*, 1938, **122**, 81.
[3] *Yale J. biol. Med.*, 1938, **11**, 49.
[4] *Lancet*, 1937, **2**, 1353.
[5] *Amer. J. digest. Dis. Nutr.*, 1938, **5**, 467.
[6] *Z. klin. Med.*, 1938, **135**, 1.
[7] *Brit. J. Surg.*, 1938, **25**, 884.

Pavlov also demonstrated the chemical phase of gastric secretion: if meat extracts, partially digested food, or even water itself are introduced into the stomach after division of its extrinsic nerve supply a further flow of juice is obtained. Edkins suggested on admittedly inconclusive evidence that a hormone, "gastric secretin" or "gastrin," is liberated from the pyloric mucosa, passes into the blood stream, and finally reaches the fundus of the stomach, stimulating it to activity. Though this chemical phase has been intensively investigated, no final conclusion has yet been reached. Extracts of pyloric mucosa can undoubtedly stimulate gastric secretion, but so can suitably prepared extracts of many other organs and tissues. Ivy claims that "gastrin" is identical with histamine, which, it is well known, produces a copious flow of highly acid secretion. The action of histamine is, however, so widespread and its general circulatory effects may be so undesirable that it is doubtful whether it acts as the chemical link between the pyloric and fundic mucosae. During the so-called histamine test meal there is a fall of blood pressure, quickening of the heart, intense flushing of the skin of the face, and (in animals at any rate) a marked secretion of saliva and of pancreatic juice. Komarov[8] in Babkin's laboratory has worked on the assumption that gastrin may chemically resemble secretin (which acts on the pancreas) and prove to be a protein derivative. Acid extracts of pyloric mucosa were prepared and treated with trichloracetic acid; the precipitate was purified and finally extracted with saline and shown to be histamine-free. The material did not lower blood pressure or affect bowel movements, but it induced a profuse secretion of gastric juice of high acidity and poor in pepsin; previous administration of atropine had no effect on this reaction. This gastrin had a negligible effect on pancreatic secretion and the flow of bile, and it could not be extracted from the fundus of the stomach.

The studies just summarized need to be supplemented by evidence that a gastric secretagogue substance appears in the blood at the height of normal gastric digestion. Ivy and others claim that meat extracts introduced into a pyloric pouch which has been completely separated from the fundus except for the vascular connexions will induce a flow of juice from the latter. If this evidence is accepted, then the existence of a normal gastrin mechanism cannot be further doubted. E. B. Lewis[9] has studied the site of formation of gastrin by examining the effects of removal of the pyloric mucosa in dogs. After the operation, the fundus appeared to be healthy and responded normally to injection of histamine. The secretion of acid in response to ingestion of meat was, however, much reduced. Lewis naturally argues from his results that meat normally liberates gastrin from the pyloric mucosa. Though it is doubtful whether histamine is identical with gastrin, another possible physiological role has been suggested for it. Normal gastric juice contains a substance indistinguishable physiologically from histamine[10]; its concentration fluctuates between 4 and 20 μg. per litre and varies directly with the rise and fall of the rate of flow of gastric juice. It is unrelated to the histamine level in the blood, and so presumably does not represent a passive transudate from the blood into the lumen of the stomach. Babkin[11] suggests that stimulation of the vagus liberates acetylcholine as its first chemical transmitter, and this in turn releases histamine, which, penetrating the oxyntic cells, causes a discharge of HCl; some of the histamine escapes with the gastric juice. Other substances have been identified in gastric juice,[12] among them acetylcholine itself, the P factor of Gaddum and Euler, and a toxic agent which inhibits intestinal movements. In addition to the pyloric chemical phase, an intestinal chemical phase of gastric secretion has been established. The introduction of certain foodstuffs into the isolated denervated duodenum may stimulate gastric secretion as a result either of the absorption of certain digestive products or of the liberation of a hormone.

The influence of the diet on gastric secretion is very complex.[5] Hydrolysed proteins and peptones stimulate secretion probably via the pyloric and intestinal chemical mechanisms. Glucose elicits a scanty secretion of juice; choline and lecithin[13] enhance the secretion of pepsin. Fat has a dual action, both inhibitory and excitatory. The former effect is partly or mainly exerted from the small intestine and is independent of the integrity of the nervous connexions or of the entrance of fat into the blood stream. Ivy[14] attributes the action to the liberation of an intestinal hormone, enterogastrone, which he thinks is identical with an inhibitory agent that he has extracted from the intestinal mucosa. The exact nature and site of origin of Castle's intrinsic factor are still uncertain. Petri and his colleagues,[15] extending their earlier work on dogs, have removed the stomach in young swine at the age of 1 to 2 months. The animals became emaciated and developed a severe microcytic hypochromic anaemia; marked pellagra-like

[8] *Proc. Soc. exp. Biol. N.Y.*, 1938, **38**, 514.
[9] *Surgery*, 1938, **4**, 692.
[10] *Quart. J. exp. Physiol.*, 1938, **28**, 87.
[11] *Canad. med. Ass. J.*, 1938, **38**, 421.
[12] *Amer. J. Physiol.*, 1938, **122**, 631.
[13] Ibid., 119.
[14] *Cold Spring Harbor Symp. quant. Biol.*, 1937, **5**, 405.
[15] *Amer. J. med. Sci.*, 1938, **195**, 717.

changes took place in the skin, and extensive degeneration occurred in both the central and the peripheral nervous systems. The condition was not helped by large doses of vitamins A, B, C, and D, but responded to stomach extracts (like ventriculin) and when whole gastric juice was given. It is claimed also that certain clinical cases of "pellagra" or "alcoholic neuritis" which are not amenable to the usual forms of therapy improve rapidly with gastric juice or extracts. It is suggested that gastric juice contains intrinsic factors that are necessary for the maintenance of a normal state of the central nervous system and the skin.

INDUSTRIAL SOLVENTS

The rapid progress of organic chemistry in these times leads to the continual introduction of new compounds for domestic and industrial purposes. The medical profession is particularly well acquainted with the synthetic drugs that appear month by month in such embarrassingly large numbers, and a comparable activity is occurring in the field of the solvents and cleansing agents. Twenty years ago these numbered less than a dozen, whereas to-day there are more than a hundred in use. Unfortunately the accurate estimation of the possible toxic actions of a new organic compound is a very difficult matter; as a result the organic chemists have completely outrun the pharmacologists, and our knowledge concerning the action on man of many of the new compounds in use is extremely scanty.

Professor Flury[1] has recently given a short but very clear review of this problem. One outstanding difficulty is that in many cases a portion of some relatively harmless substance may be changed into a toxic agent. In such an event the immediate effects give no indication of the real toxicity. Methyl alcohol is a well-known example of a substance which brings about secondary poisoning of this type. Its immediate narcotic action is feebler than that of ethyl alcohol, but methyl alcohol is in part converted into formates, and these are highly poisonous. Similarly the glycols after oxidation can produce oxalates and thereby act as severe kidney poisons. Flury suggests that the harmful properties of the chlorinated hydrocarbons may be due to formation of toxic oxidation products such as phosgene. These secondary intoxications are much more likely to be caused by continuous exposure than by a single administration; furthermore, they depend on metabolic processes which differ in different species, and hence a substance may be harmless to one species and toxic to another. The mere statement of these points at issue is enough to indicate the extreme difficulty of determining by means of animal experiments whether a new organic compound is likely to be safe for human use. The possible toxicity of new industrial solvents is a problem of particular importance, but similar problems arise in regard to the use in many other fields of new synthetic organic chemicals. The tragic affair in America that resulted from the incautious employment of di-ethylene-glycol as a vehicle for a drug illustrates the general principle of the need for determining carefully the poisonous potentialities of new compounds before adopting them for human use.

The introduction of synthetic organic substances in large numbers for domestic or industrial or medical purposes is a relatively new phenomenon, and at present there is no organization adequate to deal with the difficult task of estimating the toxicity of the new compounds that appear with such frequency. Much excellent work has been done in Government institutions in Berlin and in Washington, and in this country the Medical Research Council has begun to investigate the problem. It would appear, however, that in the near future it will be necessary to organize research on a much larger scale. Organic chemistry moves forward with ever-growing speed, and unless more care is taken in the future than has been taken in the past we may encounter tragedies worse than any hitherto recorded.

[1] F. Flury. 1939. Bericht ü.d. VIII. Internat. Kongress f. Unfallmedizin v. Berufskrankheiten, p. 795.

MEASURING BLOOD PRESSURE

The joint recommendation of the Cardiac Society of Great Britain and Ireland and the American Heart Association for a standard technique in the measurement of blood pressure has just been published in the current issue of the *British Heart Journal* and in our columns this week at page 184. About twenty-five years ago the clinical sphygmomanometer was a novelty, but to-day its use is a part of every medical examination. In fact many patients know their blood pressure, even the diastolic, and follow its course only too closely—as closely as the patients in the *Magic Mountains* followed the vagaries of their temperature charts. Although the significance for health of changes in the blood pressure has sometimes been exaggerated (and apparently symptoms may arise only after a patient learns what his blood pressure is), the importance of measuring it in many diseases, as well as in cardiovascular conditions, is so obvious as to require no emphasis. Not infrequently it provides the key to diagnosis. In the cardiovascular disease of older people which now accounts for a high proportion of the death rate arterial hypertension looms

large, and the relation between this and expectation of life is indicated by the significance attached to blood-pressure readings in life assurance and other examinations.

The essential matter of all measurement is accuracy, and, as the report points out, the technique employed in estimating blood pressure has not been uniform; this lack of uniformity, coupled with the use of apparatus which is not always reliable, has been the cause of erroneous readings. Perhaps the most frequent error is under-estimation. It appears that the diastolic pressure, whose importance at least equals that of the systolic, is frequently not estimated at all, a fact which suggests that to some medical men taking the blood pressure is little more than a ritual. Blood pressure, it is pointed out, fluctuates physiologically according to the patient's physical and mental condition, and readings to very narrow limits are meaningless. It will usually suffice to record the pressures to the nearest 5 mm.—for example, 132/78 should be recorded as 130/80—but to obtain even this degree of accuracy there are many points in the technique to which attention must be paid and which are sometimes overlooked. The patient must be at physical and mental ease, but the British Committee does not consider it important whether he is sitting or lying. The arm (and which one should be specified) should be free of clothing, and the pressure cuff (of adequate size) should be applied symmetrically over the brachial artery and properly covered with the attached material; in an obese arm bulging of the cuff beyond its covering may lead to error. Inflation and deflation should be neither too rapid nor too slow, and the systolic pressure should first of all be checked by palpating the radial artery. This preliminary palpation will also ensure that the observer is not deceived by the silent gap—that is, the time during which the arterial sounds are absent over a range of pressure appreciably below the true systolic. If the figure with palpation is higher than by auscultation there is some error in technique, probably the inexact placing of the stethoscope over the brachial artery. The joint recommendation defines the systolic and diastolic points, and it is on the latter that greater differences of opinion have been expressed in the past. The American Committee recommends that when the diastolic point is not sharply defined the pressure at which the sounds become muffled and that at which they cease should both be recorded. With gross arrhythmias no figures for either systolic or diastolic pressure can be exact, as they vary from beat to beat, but the report shows how certain approximations can be obtained. A valuable sign which may be elicited during sphygmomanometry is pulsus alternans, and this will be revealed by careful attention to the sounds at the level of systolic pressure. The sphygmomanometer itself needs supervision, more especially if of the aneroid type, and this pattern should be calibrated periodically. The mercury manometer also needs testing for accuracy at intervals, and the mercury level must be correctly maintained and the air vent in the calibrated tube kept free. The report should be of great value to the medical profession.

SIR JAMES MACKENZIE'S HEART

There was probably no condition in which Mackenzie was more interested than angina pectoris, and it was a curious irony that he was to suffer severely from this disease during the last years of his life. He described his own case anonymously in his book *Angina Pectoris* (Case 28), and it was typical of the man that he should express to his friends the wish for his heart to be examined after death in order to ascertain what light could be thrown on his symptoms. The results of this examination are described in the current number of the *British Heart Journal* by Professor David Waterston. Mackenzie experienced his first attack of severe cardiac pain in 1908 at the age of 55. It happened at night when resting, and followed a period of dining out at frequent intervals. The pain was felt across the chest and down the left arm; it varied in severity, and Mackenzie noted that during the attack he could not lie still but had to move about. The pain lasted two hours, when he fell asleep after taking 10 grains of veronal. The next day he was quite well, but after some time he noticed that pain could be provoked in special circumstances, as walking in cold air or after meals. From 1922 onwards activity was drastically and progressively limited by anginal pain; and he was forced by the influence of cold on his angina to return from St. Andrews to London. In addition several severe attacks occurred when he was at rest. The last took place on January 24 and 25, 1925, when he was 72 years old, death following on January 26, apparently without pain. Mackenzie was a big man—6 feet 2 inches tall and weighing 15 stone. His heart weighed 510 grammes. Some atheroma of the aorta was present, but the chief changes were in the wall of the left ventricle and in the coronary arteries.

"*The left ventricle* was a large and thick-walled chamber. The muscular wall, for the most part thick and firm, was 27 mm. in thickness near the base. At the apex, as usual, it was thin and only 3 mm. in diameter. In colour it was somewhat pale. In its substance were several small whitish patches of fibrous tissue, in size from a pin's head upwards. In the anterior wall, 30 mm. above the apex, there was a patch of fibrous tissue 8 by 3 mm. and another patch of similar structure and size lay in the substance of the posterior wall, about midway between apex and base. At the apex there was a small recent haemorrhagic infarction involving the deeper part of the muscle wall, covered by a nodular reddish-brown mass of clot the size of a cherry stone which projected into the cavity of the ventricle. . . . Section through this and the adjacent wall showed that the nodular tissue extended into the substance of the muscular wall, which was here reduced to a narrow margin 3 mm. thick."

Both coronary arteries, and particularly their medium-sized and smaller branches, were much affected by degenerative changes causing great thickening of the walls and diminution of the lumen. The arteries most affected were those in the anterior ventricular furrow; of these there were two, one from each coronary stem. A recently occluded vessel was not found as a cause for the infarction mentioned. The chief conclusion reached from this examination is that Mackenzie probably suffered from several attacks of thrombotic closure of the smaller branches of the coronary arteries,

the first happening at the time of his first attack of pain seventeen years, and the last a few days, before he died. It may perhaps strike the reader as curious that so able and accurate an observer, as Mackenzie undoubtedly was, did not recognize the difference between what we now know as coronary occlusion and angina of effort, particularly when the two kinds of attack seem to have been manifested in his own person. But it must be remembered that Mackenzie was making immense contributions to medical science in the middle of a busy life as a practitioner. Beyond recognizing that deficient blood supply to the heart had something to do with the source of the afferent impulses responsible for anginal pain, he did not pursue his inquiries further into the precise manner in which such impulses might arise. More important than his contributions to actual knowledge was the stimulus Mackenzie gave to clinical investigation, and it is fitting that an examination which he directed to be carried out should have provided the key to his clinical history.

SODIUM DIPHENYL HYDANTOIN FOR EPILEPSY

The treatment of idiopathic epilepsy, which was discussed at great length at the meeting of the Royal Medico-Psychological Association last week, is still entirely symptomatic owing to our ignorance of the basic abnormality causing spontaneous convulsions. The usual anticonvulsant mixtures containing bromides and various compounds of barbituric acid, especially phenobarbital, usually diminish the frequency of fits and sometimes completely control them. Other forms of treatment, such as restriction of fluids and ketogenic diets, are occasionally efficacious. At its best, however, the medical treatment of epilepsy is prolonged and uncertain. In an attempt to discover further anticonvulsants Putnam and Merritt[1] produced convulsions in cats by means of a graduated faradic current. They estimated the effect of a wide range of drugs on the threshold of the convulsions. One of these—sodium diphenyl hydantoinate—was more efficacious than phenobarbital, to which it is allied. Sodium diphenyl hydantoinate has been marketed as "dilantin" in the U.S.A. and as "epanutin" in this country. Condensation of urea with malonic acid forms barbituric acid, and, with glycollic acid, the compound hydantoin. The diphenyl salt of this compound is closely related to nirvanol, but the substitution of two phenyl groups for an ethyl-phenyl group has reduced its toxicity greatly. Sodium diphenyl hydantoinate was administered by Merritt and Putnam[2] to a large group of epileptic patients who had not responded satisfactorily to any of the usual anticonvulsants. Complete cessation of grand mal occurred in 58 per cent. and of petit mal in 35 per cent. of cases. As all the patients had been resistant to previous treatment this result was most encouraging. Unfortunately the drug is more toxic than the barbiturates and the inorganic anticonvulsants, and symptoms such as morbilliform eruptions, ataxia, tremors, diplopia, nausea, and vomiting occurred in 15 per cent. of the cases. These symptoms rapidly disappeared in most cases and dangerous toxicity was rare. As there was no associated narcotic effect, so common in the anticonvulsants, it seemed that the drug would be useful in the treatment of epilepsy. The authors have more recently reported[3] the results of two years' treatment, and have studied the control of the toxic effects of the drug. They report that diphenyl hydantoin was more efficacious than other therapy in 79 per cent. of cases. Although isolated favourable reports have already been made in this country by D. J. Williams,[4] the results of further clinical trials have not yet been published. Well-controlled groups of patients are being followed, and dramatic relief is occurring in some cases of both grand mal and petit mal. Many workers have, however, been disappointed by the early appearance of toxic effects, for the margin of safety between the therapeutic and toxic doses is small and sometimes absent. Temporary withdrawal of the drug causes a rapid disappearance of these symptoms, which seem to be more alarming than dangerous. Remissions in epilepsy so often occur when treatment is altered that evaluation of any therapeutic agent needs prolonged observation. The present position may therefore be summarized by saying that the drug will often cause a remission when all other anticonvulsants have failed to do so, but that when it is being given the patient must be closely watched. The next step is to discover a less toxic derivative of hydantoin which has a similar anticonvulsant effect without any associated narcotic action.

[1] *Science*, 1937, **85**, 525.
[2] *J. Amer. med. Ass.*, 1938, **3**, 1068.
[3] *Proc. Amer. neurol. Ass.*, June, 1939.
[4] *Proc. roy. Soc. Med.*, 1939, **32**, 872.

REGIONAL ENTERITIS

In 1932 Crohn in New York described the condition now known as regional enteritis, terminal or regional ileitis, segmental enteritis, or more simply as Crohn's disease, and W. A. R. Chapin[5] tells us that in the American literature alone over thirty articles have appeared since Crohn's first paper. This year both Chapin and Crohn[6] have contributed further to our knowledge. Involvement of only the terminal part of the ileum was described in the first cases; later the disease was observed more proximally in the small intestine and has even been recorded in the stomach and in the colon. Originally looked upon as affecting young adults, Crohn's disease is now known to cover rather wide age groups and to be somewhat commoner in men than in women. Chapin suggests that it may be commoner in Jews than in Gentiles, but in his latest paper Crohn maintains that the disease will be proved to have no racial predilection. The aetiology of the condition remains obscure despite suggestions of an association with bacillary dysentery. Its symptomatology is varied, but the chief clinical features are pain in the right iliac fossa, pyrexia, leucocytosis, loss of weight, sometimes a palpable tumour. Needless to say, appendicitis has often been diagnosed and appendicectomy performed, the disease having been over-

[5] *New Engl. J. Med.*, 1939, **220**, 232.
[6] *Surg. Gynec. Obstet.*, 1939, **68**, 314.

looked through the small incision made for the appendicectomy. Barium meals and enemas may sometimes help by showing narrowing of a small segment of bowel. The condition is essentially inflammatory and may spread or subside, give rise to stenosis or stricture, or result in the formation of fistulae. There can be no doubt that spontaneous recovery occurs in many cases, and more than one surgeon has opened the abdomen to find the lesion previously seen, completely resolved at the second operation. Treatment is still an open question—whether it should be essentially conservative, radical as by resection, or palliative by short-circuiting anastomosis: probably all three have their place. If the condition is subsiding it is probably better to do nothing, but if it is progressing resection would appear to be preferable to short-circuiting in most cases: an anastomosis may have to be carried out, however, as a preliminary stage to resection. Even after resection recurrences in other parts of the intestinal tract have been known.

THE THYMUS

The thymus remains the last major mass of possibly glandular tissue whose function continues to defy elucidation. The now classical work of Rowntree,[1] who produced extreme precocity in young animals at birth by continued injection of thymus extracts through several generations of the parents, provides perhaps the best evidence that the thymus fundamentally influences development; but even this work has not been adequately confirmed, and there are still many who believe that the thymus has no endocrine function at all. It is precisely because of this lack of an adequate physiological background that any hints provided by clinical study are of great importance and must be critically examined. The number of clinical conditions which have been thought to be associated with overaction of the thymus is very large and varied. Perhaps the best-known is that called status lymphaticus, but the association of this with an enlarged thymus has been effectively disproved by Young and Turnbull.[2] Recently Leriche,[3] who has already been responsible for many stimulating suggestions in other fields, has claimed notable success in cases of arrested development by surgical removal of the thymus when this has been found enlarged. One case was that of an underdeveloped girl of 17 years, very asthenic and easily tired, with child-like appearance. Removal of a large thymus led to a "surprising transformation" within a few days. But the further history of this child is not yet known. Nicola Pende[4] has gone further in characterizing a hypogonadal syndrome associated with thymic enlargement and benefiting from treatment of the thymus. He believes that a group of cases can be distinguished from those usually classed as Fröhlich's syndrome. In common with this latter condition there is obesity, especially of the breasts, cheeks, abdomen, hips, and loins in both sexes, and sexual under-development shown by delayed menarche in girls and small penis and small, often undescended, testes in males. In contrast to Fröhlich's syndrome, however, Pende's group shows other constant features such as large upper incisor teeth, laxity of articular ligaments leading to genu valgum and flat-foot, adenoids, and often enlarged tonsils and spleen. Further, the second dentition is usually delayed, the blood pressure may be moderately raised, and the blood shows a relative lymphocytosis. Pende attributes this condition to a constitutional hyperfunction and hypertrophy of the thymus. He admits that this thymic hypertrophy is not readily revealed by *x* rays, but claims that by a special type of percussion retrosternal dullness can be demonstrated. In this condition *x*-ray therapy to the thymus is said to be rapid, definite, and specific in its results. The retrosternal dullness disappears, and within a year most cases have returned to normal, with descent of the testes into the scrotum in boys, onset of menstruation in girls, and, indeed, all the manifestations of normal puberty. Time alone will tell whether clinical claims such as these can establish themselves or whether they will be forgotten like so many of their predecessors. Physiology at present cannot profitably give them either support or criticism.

[1] *N.Y. St. J. Med.*, 1936, **36**, 1277.
[2] *J. Path. Bact.*, 1931, **34**, 212.
[3] *Mem. Acad. Chir.*, 1939, **65**, 329.
[4] *Dtsch. med. Wschr.*, 1939, **65**, 210.

THE HALF-YEARLY INDEXES

The usual half-yearly indexes to the *Journal* and to the *Supplement* are now ready. They will, however, not be issued with all copies of the *Journal*, but only to those readers who ask for them. Owing to the nature of its contents the *Key to Current Medical Literature* is not indexed. Any member or subscriber who wishes to have one or both of the indexes can obtain what he wants, post free, by sending a postcard notifying his desire to the Finance Department, British Medical Association House, Tavistock Square, W.C.1. Those wishing to receive the indexes regularly as published should intimate this.

We announce with much regret the death of Professor John Mellanby, M.D., F.R.S., Waynflete professor of physiology in the University of Oxford since 1936 and formerly head of the department of physiology at St. Thomas's Hospital Medical School.

The death is announced from Sydney of Sir John Lawrance McKelvey, F.R.A.C.S., honorary surgeon to the Prince Alfred Hospital and lecturer in clinical surgery in the University of Sydney. He had been a member of the New South Wales Branch of the British Medical Association since 1909.

News has been received from Capetown of the death of Professor William Adam Jolly, D.Sc., M.B., who had held the chair of physiology at Capetown University since 1911. He was vice-president of the Cape of Good Hope Western Province Branch of the British Medical Association in 1925.

WAR WOUNDS AND AIR RAID CASUALTIES

The following is one of a series of lectures on the Treatment of War Wounds and Air Raid Casualties recently delivered at the British Postgraduate Medical School

THE ABDOMINAL INJURIES OF WARFARE—I

BY

GORDON GORDON-TAYLOR, O.B.E., M.A., F.R.C.S.

Ever since "the dark backward and abysm of Time" the belly of an enemy has constituted an instinctive target, and the relative proximity of adversaries has in no small measure determined the incidence of abdominal wounds received in conflict. The vulnerability of the abdomen in the geological eras, when but a short space can have separated rival foemen, is attested in museums, where may be seen portions of the human lumbar spine with impaled flint arrow-heads; some of these relics embedded in the anterior portion of the vertebral bodies limn with unerring surety the transabdominal course of a missile shot long ages ago by some enemy hand of the Neolithic period, a dual monument to victor and to slain.

Incidence and Mortality

In the last great European conflagration, with the augmented frequency of wounds produced by artillery fire, injuries of the abdomen amounted to only 2 or 3 per cent. of all the wounded who reached an organized surgical formation; but, of course, large numbers of those injured in the abdomen died "on the field." It is of interest to learn that abdominal wounds accounted for no less than 9 per cent. of the casualties sustained in the recent air bombardments of Barcelona, and were mostly of a penetrating character. Many of those injured in the abdomen by enemy aircraft, especially by means of the so-called "liquid-air" bomb, had multiple wounds. The wound of entry may be small and easily overlooked, and yet most grievous damage may have been inflicted on the abdominal viscera. Careful scrutiny must be made of the whole body in the case of men and women injured by this form of enemy action.

Wounds of the abdomen which are inflicted by the modern missiles of warfare exert their lethal effect by producing haemorrhage or by engendering sepsis either through infection carried in with the fragment of high explosive or through damage to the hollow viscera of the belly, especially the gastro-intestinal tract. The bowel is that portion of the alimentary tube most liable to be wounded, and is damaged nine or ten times as often as is the stomach.

Personal experience and the published figures of other military surgeons testify that haemorrhage or the shock–haemorrhage syndrome is largely responsible for the deaths occurring in the early hours after wounding, and that those who die later mainly perish from sepsis. This does not absolve the surgeon from the necessity for rapidly deciding whether to operate or to abstain, even in those cases of penetrating wound of the belly where haemorrhage is not the prominent clinical feature.

The dangers attaching to wounds of the hollow abdominal viscera preponderantly outweigh those attending lesions of the solid organs, unless associated damage to important and intimately related blood vessels threatens life: in all abdominal injuries early diagnosis and decision are the necessary prelude to success. It must, however, be admitted that hollow viscera have escaped injury when the intestinal area has been transfixed by missile or even by bayonet, and Gordon Bell's famous case furnished indisputable evidence that a natural cure might result when the bowel was actually penetrated. Spontaneous healing of gastric wounds has also been recorded. Such results are the freaks of fortune, and are to be disregarded in the formulation of rules for those called upon to deal with gunshot wounds of the belly. In the abdomen there are no insignificant wounds.

Diagnosis and Prognosis

The diagnosis of intestinal injury due to a penetrating wound in the abdomen is never beset with the same difficulty that obtains in deciding whether the bowel has been damaged by contusion or non-penetrating violence, and the indications for treatment are crystal-clear. Whatever the traumatic agency—a laceration by spike or stake, a stab with a knife, dirk, or dagger, a bayonet thrust, or the more frequent gunshot wound from bullet, shell, or bomb—the general principles of treatment are alike. A penetrating wound in the abdomen probably means a penetrating wound of bowel or other abdominal viscus, and demands the earliest surgical intervention, unless a wisdom and prescience born of great experience justifies self-restraint.

An escape of faecal material or flatus from a wound involving the abdominal parietes or even a portion of the body somewhat remote from the peritoneum is self-evident proof of an intestinal lesion; an abundant and persistent discharge of blood from wounds in the back, flank, or anterior belly-wall, an ebb which flows the faster and with greater force when the patient coughs or makes any effort, will likewise suggest some deep visceral lesion, and will call for surgical exploration. No comment is needed upon those cases where a portion of bowel or omentum projects from a wound in this region; and still more significant will be the diagnosis, and still more urgent the need for resuscitatory methods and preparation for laparotomy, if the wounded man is shocked, blanched, or passes blood from the rectum or if there is haematemesis. The situation of the wound may, however, not at first suggest an involvement of the coelomic cavity or its contents: it is perhaps hardly necessary to reiterate the frequency with which gunshot wounds of the buttock implicated the peritoneum or to emphasize the danger with which these injuries were fraught in the war of 1914–18.

The wound of entry may be in the thorax, and the missile, passing through the diaphragm, may implicate the gastro-intestinal tract. It has been pointed out by others, as well as by me, that the immediate prognosis of abdomino-thoracic wounds is in very many cases largely determined by the nature of the abdominal injury, and that those accompanied by a wound of a hollow viscus are very fatal: Sir Cuthbert Wallace found that only seven out of twenty-eight such cases in his collective series were evacuated to the base; Gask and Wilkinson saved only

three out of thirteen such cases. Others were more fortunate, for A. L. Lockwood of Toronto had eight successful cases out of twenty, and I have a record of eleven recoveries out of twenty-two abdomino-thoracic wounds associated with hollow viscus injury, of which several were complicated intestinal lesions. The wounds of entry may be even more remote from the abdomen; they have been encountered in the supraclavicular fossa or as far down the lower limb as the region of the patella. It may be pointed out here that these longitudinal wounds are very fatal in character.

The bowel may also be damaged by small bony spicules being driven through the peritoneum, although the projectile itself does not jeopardize life, the intestine being ruptured by indirect violence without any penetration of the coelomic cavity by the missile. This type of case was familiar to all such officers as had first-hand experience of gunshot wounds of the abdomen in the 1914–18 war; the small bowel in these "burst wounds" gives way either into the mesentery or along the anti-mesenteric border; the large bowel bursts more frequently between the taeniae coli, and often behind the peritoneum, occasioning a fatal retroperitoneal cellulitis or diffuse peritonitis, as was shown by the late Hamilton Drummond and by Sir John Fraser. It must be remembered that the mere fact of penetration apart from the presence of any intestinal or visceral lesion is in itself a serious menace to life, since infection of the abdominal cavity may occur from the wound of entry and a fatal peritonitis may ensue.

What symptoms and signs enable us to make a diagnosis of intestinal injury in the less obvious cases of gunshot wounds of the abdomen? Rigidity, pain and tenderness, vomiting, the facial expression, and a rising pulse are all suggestive. No one sign or symptom is diagnostic, but when they are present in combination the clinical picture becomes more clear. An *x*-ray examination will give valuable information as to the direction of a wound produced by gunshot injury and may furnish useful information as to the best mode of approach in the particular case.

Many of the foregoing paragraphs have only an academic value; the implications of a wound of the abdomen are obvious. *Every wound, whether penetrating or not, should be thoroughly explored, excised, and disinfected.* Even if an occasional operation should prove to have been unnecessary the patient will suffer little or no detriment from the exploration; nay, rather, with the excision of his parietal wound convalescence will be more safe, the wound should heal more kindly, and the surgeon will feel secure.

Shock

The treatment of shock has already been dealt with by the very surgeon who did so much to clarify our ideas of wound shock in the front-line areas during the great war (E. M. Cowell), and it must suffice to reiterate that every effort must be made to combat the development of secondary shock. As regards the intravenous administration of fluids in those with severe shock, I was never convinced of the utility of saline or bicarbonate of soda solutions in warfare, while the employment of gum-acacia solution must have cost many lives. Fortunately, the recent work of Stuttiford of New York has severely discredited this preparation, and it has now doubtless received its *coup de grâce*. The greater the share played by loss of blood in the shock–haemorrhage syndrome the more valuable is blood transfusion, and in all severe cases its use is demanded as a primary measure. In cases of pure shock, where there is capillary atony with leakage of fluid, blood is of most temporary value, and is rapidly lost from the circulation. Possibly the employment of some vitamin infusion may prove of specific value in these cases.

Selection of Cases

In periods of rush and emergency a wise choice may have to be made of the abdominal cases awaiting the consideration of the surgeon. When the ideal of extending the benefits of surgery to all such as might legitimately be expected to profit by operation cannot be attained, it will be well to remember in this unenviable yet inevitable task of exclusion Owen Richards's slogan: "Too high, too late, and too bad." Furthermore, the experience of a quarter of a century ago taught the surgeon that a wound of the belly from a large fragment of missile was almost always fatal. Worthington, however, in the last war had a successful case where a fragment of shell weighing over half a pound was lying loose in the peritoneal cavity; there were two wounds of the ileum and one of the sigmoid. I saved another patient, who survived a double resection of bowel and bladder injury produced by a fragment of high explosive weighing just under a quarter of a pound. Such cures are exceptional, and cases of this kind should not be given preference over those that are more promising.

Those wounded who have extrusion of bowel from the abdominal cavity, especially if this be badly damaged, make poor recoveries. They are "bad surgical risks," although their general appearance and condition may deceive the observer; yet a number of marvellous recoveries of this nature, of course, resulted, and the first successful abdominal operation upon the British front concerned a Scotch Canadian who walked back from the German lines with his intestines extruded. A successful resection of six feet of small intestine was performed by Owen Richards, and the specimen is in the Museum of the Royal College of Surgeons of England.

Anaesthesia

Gas-and-oxygen produced the best results in the surgery of gunshot wounds of the abdomen: the finest statistics of all came from that excellent surgeon D. C. Taylor, who had the good fortune to be associated with Geoffrey Marshall. Not only was the latter a most able administrator of gas-and-oxygen, but he also taught its use to many of those charged with the duty of giving anaesthetics in the clearing stations. The badly injured abdominal case proves an easy subject for gas-and-oxygen administration. Only a lunatic would employ spinal anaesthesia, but I made much use of supplementary local or regional anaesthesia, unless the proximity of contaminated or septic wounds precluded it. Ether gave the best results in the hands of the majority of anaesthetists, and is perhaps the most useful of all anaesthetics. The employment of the barbiturates is to be deprecated in those with grave abdominal injury, and reliance should be placed upon morphine, omnopon, scopolamine, atropine, and such well-tried pre-operative injections.

Speed is the handmaid of success in the operative treatment of wounds of the abdomen, by whatever agency produced. There is no room for the surgical tortoise on the floor of any operating theatre in a casualty station or advanced base which is dealing with gunshot injuries of the belly. The captain of a surgical team who lacks the power to hurry wastes his own time and also that of nurses, anaesthetist, and henchmen; for not only will he fail to save those wounded men who might have

been rescued by one of a faster turn of speed, but he will also be debarred by the passage of time from extending help to others who are looking to surgery to save their life and limb.

Operation

In cases where there is more than one wound it is of paramount importance to deal with those situated on back, buttocks, or the posterior aspect of the lower limbs before the abdomen is opened. When a patient has had a laparotomy the act of turning in order to secure ready access to a wound on the back produces a great fall of blood pressure, which may prove fatal. This instruction cannot be too firmly insisted upon: the hindmost shall be first!

In most cases it will be wise to make a median or paramedian incision of generous dimensions. On opening the abdomen the first step will be to control such haemorrhage as is taking place; the bleeding most frequently comes from the mesentery, but may originate in a wound of omentum or the bowel itself. The intestine may bleed freely, as may the stomach, especially the vessels along its curvatures, and also on the walls of the viscus itself. The liver, spleen, and kidney must be investigated as possible sources of intraperitoneal bleeding; in the case of the spleen and kidney it is wise not to remove the injured organ unless haemorrhage is menacing life. A conservative attitude should be especially adopted in the first instance in respect of kidney injuries, and although in a certain number of cases where conservatism has at first been shown a secondary nephrectomy may prove necessary, a considerable proportion of kidneys are saved.

A retroperitoneal haematoma, if leaking into the peritoneal cavity, may demand attention, and severe haemorrhage from the inferior vena cava has been controlled successfully by suture (Sampson), or more easily by one or more pressure forceps applied to the rent in the vein, and left in position for some days with the handles projecting from the abdominal wound (D. C. Taylor, Gordon-Taylor).

Small Intestine

The small intestine, as that portion of the digestive tract most liable to injury, must be systematically inspected, coil by coil. It is well to start at the ileo-caecal junction and work upwards to the duodeno-jejunal flexure; on the other hand, the direction may be reversed. The surgeon must satisfy himself as to the condition of each loop on the first inspection: there must be no second look, after each coil has in its turn been replaced inside the abdomen. The patient is already shocked: evisceration and rough handling will augment the shock and jeopardize his life.

The surgeon must remember the possibility of wounds between the layers of the mesentery, and must examine any haematoma, especially if crepitant, in the vicinity of the duodenum, lest a retroperitoneal rupture of this fixed part of the small gut be overlooked. Perforation, or even rents of the small bowel, with the corolla-like eversion of the mucosa (Fig. 1), can well be dealt with by simple suture, and this method of repair should always be employed wherever it seems appropriate. A single Lembert stitch of silk or thread, on a round-bodied needle, suffices for the treatment of this type of perforation.

The pathological anatomy of gunshot wounds of the abdomen is hardly likely to differ, save in degree, from those encountered in the war of 1914–18; but if surgical technique does vary in the future the explanation will be found in the greater shattering effect of high explosive, which is more likely to produce wounds of the intestinal tract necessitating resection rather than conservative repair.

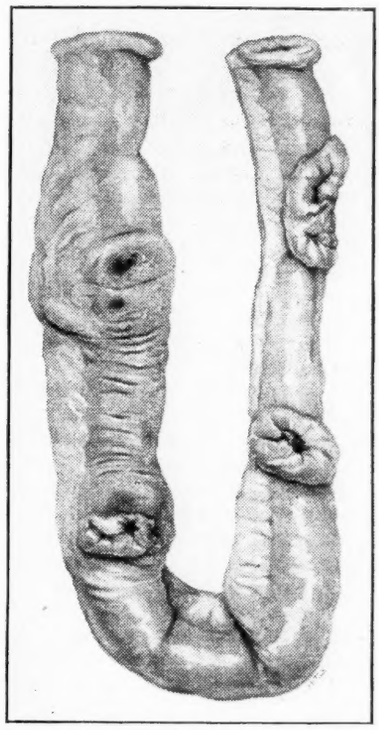


FIG. 1.—Penetrating wound of small intestine of gunshot origin, showing the corolla-like eversion of the mucosa. (War Collection, R.C.S.)

Resection of small intestine should be employed in the following circumstances:

(*a*) The separation of the intestine from its mesentery for a distance of over three-quarters of an inch. (This understates the figure given by several writers on military abdominal surgery.) In the event of severe contusion or laceration of the implicated bowel any mesenteric detachment must be regarded still more seriously.

(*b*) Where the proximity of multiple wounds is likely to render the results of their individual suture a mosaic of threads or a misshapen patchwork, probably resulting in interference with the mechanical function of the bowel.

(*c*) In cases of intestinal infarction.

(*d*) When the weight of the missile has crushed the life out of the damaged intestinal coil.

(*e*) Where perforations are so numerous and extensive it may be less time-consuming to include all the lesions in one segment of bowel ablated.

The old bogy of the dangerous mesenteric angle was dispelled in the last war, and few operators entertain that surgical respect for the jejuno-ileum which is felt towards the large bowel.

(*The article will be concluded in next week's issue*)

We have received from Sir Henry Wood the statement of receipts and payments of the Henry Wood Jubilee Fund, which was organized to endow beds in London hospitals for British orchestral musicians. The amount received from all sources was £8,824, and of this sum £8,500 has been paid to five hospitals in the London area and one on its borders. The balance, less a small sum expended on postage, printing, and stationery, has been handed to the British Musicians' Pension Society, 21, Albert Embankment, S.E.11, which administers and acts as referee of the fund.

MEASUREMENT OF ARTERIAL BLOOD PRESSURE

A STANDARD TECHNIQUE

We print below a joint report of the committees appointed by the Cardiac Society of Great Britain and Ireland and the American Heart Association on standardization of methods of measuring the arterial blood pressure.

The genesis of the joint report that follows may be explained shortly. In September, 1938, the American Heart Association appointed a committee to draw up recommendations for a standard technique for taking arterial blood pressure, and asked the Cardiac Society of Great Britain and Ireland if they would like to appoint a similar committee which should if possible issue a joint report with the American Committee. The Council of the Cardiac Society approved of this course and appointed a committee for the purpose.

The reader may feel that such recommendations are not needed and that everyone knows how to take the blood pressure and does it in the same way. The committee have learnt that this is not the case and that many physicians differ in small points of technique, often without realizing that their custom is not universally accepted.

The British Committee met on November 19 and had before them the results of various preliminary inquiries and the excellent short recommendations put forward by a committee of the Assurance Medical Society in May, 1931, and published in their journal. The British Committee drew up some recommendations which were discussed with many members of the Council and with other physicians and physiologists. At a second meeting on January 21, 1939, these were put into final shape, and were sent to America early in February. The recommendations and report of the American Committee were received about this time, and it was obvious there was a good deal of common ground, but a few outstanding differences. A composite report was drawn up incorporating these agreements and differences, and this has since been the basis for discussion in both countries. This was then brought before the Council of the Cardiac Society, who authorized their committee to publish an agreed draft within the compass of these recommendations.

The British and American Committees have both accepted many suggestions where they thought the other had made useful additions or had expressed the recommendations more clearly; both, however, have retained to some extent their own phraseology where they thought this more appropriate to their country and have set forth with different emphasis the three remaining points in which agreement was not reached. Two of these three are simple: the British Committee expressing a preference for the mercurial manometer as less likely to get out of order, and expressing no choice as to whether the patient is lying down or sitting provided he is comfortable; the American Committee preferring that he should be seated, but expressing no preference between the mercurial and aneroid instruments, provided they are in good condition.

The third more important difference is in the method of recording the diastolic pressure. Both committees agree that the point where the loud, clear sounds change abruptly to the dull and muffled sounds should be recorded. The British Committee think this is the only point that should be recorded and that it can nearly always be detected accurately, though at times only with difficulty. The American Committee, influenced perhaps by this difficulty, recommend that the point where the sounds disappear should also be recorded.

Apart from these three differences, which are dealt with in the report, and the phraseology, the reports and recommendations were in substantial agreement, and it has been agreed, therefore, that they should be published in each country over the joint signatures of both committees.

Committee for Standardization of Blood Pressure Readings

Appointed by Cardiac Society of Great Britain and Ireland

Dr. Crighton Bramwell, Manchester, England
Dr. Maurice Campbell, London, England
Dr. T. F. Cotton, London, England
Dr. William Evans, London, England
Dr. A. R. Gilchrist, Edinburgh, Scotland
Dr. John Hay, Liverpool, England

Appointed by American Heart Association

Dr. M. H. Barker, Chicago, Illinois
Dr. Joseph Erlanger, St. Louis, Missouri
Dr. Jonathan Meakins, Montreal, Canada
Dr. Ralph Schneider, New York City
Dr. S. B. Scholz, Jr., Philadelphia, Pa.
Dr. Harry Ungerleider, New York City
Dr. Paul White, Boston, Mass.
Dr. Carl Wiggers, Cleveland, Ohio
Dr. Irving Wright, New York City, *Chairman*

THE JOINT REPORT

Introduction

It has long been realized by many teachers and practitioners of medicine that the wide variations in blood pressure records of a single subject were due not only to changes in the pressure from time to time under different conditions, but also to the different methods used by the observers. The interpretation of the sounds heard on auscultation is an important cause of divergent readings. A recent survey of Wright and others (*American Heart Journal*, 1938, **16**, 469) revealed a serious lack of agreement as to the correct technique for taking and interpreting the blood pressure. Similar uncertainty was found among insurance companies as to what they should require of their examiners in this regard. Experiments with multi-aural stethoscopes showed that recent years have brought little if any improvement, as the discrepancy among the recently qualified was as great as among the seniors.

The committees for the standardization of methods of measuring arterial blood pressure appointed by the American Heart Association and by the Cardiac Society of Great Britain and Ireland have tried to bring about a crystallization of the best available thought on this subject. If feasible, the committees were asked to make joint recommendations which might be accepted as a standard for practising physicians, medical teachers, and insurance companies.

After a careful study of the material available from many sources and after much discussion the committees jointly recommended the following procedure as the standard method for taking and recording blood pressure readings in man. Some of these recommendations are dealt with in more detail in the explanatory notes. The British and American Committees have decided to publish over their joint signatures reports which differ slightly in wording and phraseology. In the few instances where there was any difference of opinion the views of both committees have been included in each report.

Recommendations

1. *The instrument.*—The equipment to be used for measuring arterial blood pressure, whether of the mercurial or of the aneroid type, must be in good condition and requires to be calibrated at frequent intervals against a standard mercurial manometer. The British Committee think that the mercurial type is the most dependable. The proper care of these instruments and the importance of a standard armlet are dealt with in the explanatory notes that follow.

2. *Position of the patient.*—The patient should be allowed time to recover from any recent exercise or excitement. He must be comfortable and may be either lying or sitting. The American Committee recommend that he should be sitting and that, if not, a special note should be made. The arm,

relaxed and comfortably supported at the patient's side, must be laid bare to the shoulder to avoid any constriction by a rolled-up sleeve and to facilitate proper application of the armlet.

3. *Application of the cuff.*—The cuff must be of standard size, with a rubber bag at least 12 cm. wide. The cuff, completely deflated, should be applied with the middle of the rubber bag over the inner side of the arm, and its lower edge one inch above the bend of the elbow. It should fit closely and evenly round the arm to ensure against bulging at the sides when it is inflated.

4. *Determination of the systolic pressure by palpation.*—A preliminary approximate reading of the systolic pressure should be taken by palpation as a check on auscultation; the pressure in the armlet should be raised quickly in steps of 10 mm. until the radial pulse ceases, and then allowed to fall rapidly.

5. *The application of the stethoscope.*—The brachial artery should be located by palpation, and the stethoscope applied lightly and accurately over it, just below but not in contact with the cuff. The hand may be pronated or supinated according to the position yielding the stronger brachial pulse.

6. *Determination of the systolic pressure by auscultation.*—After inflating the cuff quickly to a pressure about 30 mm. above the level of the systolic pressure as found by palpation, auscultation should be conducted during slow deflation. The systolic pressure is the highest level at which successive sounds are heard.

7. *Determination of the diastolic pressure.*—With the pressure continuing to fall slowly and uniformly, the sound increases to its maximum intensity and then decreases, at first gradually and later suddenly, and soon disappears. The point where the loud clear sounds change abruptly to the dull and muffled sounds should be taken as the diastolic pressure. The American Committee recommend that if there is a difference between this point and the level at which the sounds disappear completely the latter reading should be regarded also as a measure of the diastolic pressure. This should then be recorded in the following form—Rt. (or Lt.) 140/80–70 or 140/40–0, or if these two levels are identical as 140/70–70. The British Committee disagree with this recommendation and think that except in aortic regurgitation it is nearly always possible to decide the point at which the change comes and that this is the only reading that should be recorded.

Explanatory Notes

The Committees feel that certain other considerations in addition to these specific recommendations should be taken into account, and for convenience they are numbered in the same way as the relevant recommendations.

1. *The instrument.*—Frequent discussions have taken place as to relative merits of various types of blood pressure apparatus. The mercury manometer and the aneroid type of apparatus are both capable of correct readings if in good condition, and both may be inaccurate if they are not. This is sometimes neglected in reference to the mercury manometer, which should be tested at intervals in the following ways:

(*a*) The level of the mercury at rest should be at the zero mark. If any mercury has leaked out it must be replaced.

(*b*) If the small air vent at the top of the glass tubing becomes clogged there may be a lag which will give false readings.

(*c*) The blood pressure box must be on a level surface, since tilting of the manometer will lead to mistakes; it should also be level with the observer's eye.

The aneroid type of instrument, if used, must be calibrated frequently against a mercurial manometer. The needle should stand at zero when the rubber tubing is deflated, and move immediately when inflation begins. A stop pin at the zero mark makes it difficult to check its accuracy. In both types of instrument the valve must be competent. The entire system, including the rubber tubing and bag, must be free from leakage. The rubber cuff must be at least 12 cm. wide; it must be 23 cm. long and its covering must be of inextensible material and, if not of leather or made rigid with metal ribbing, should extend as a band 15 cm. wide for a distance of 60 cm. beyond the edge of the rubber cuff and then taper gradually to an apex during a further length of 30 cm. If bulging occurs the reading may not be accurate. For children the rubber cuff may be narrower and the covering shorter. New types of cuffs, using a zipper mechanism or rubber hooks on a ribbed extension the same width as the cuff, may prove to be more satisfactory than the long tapering cuff end.

2. *The patient.*—The sitting position was selected by the American Committee because for practical purposes it simplified the taking of large numbers of blood pressure readings. The British Committee did not think there was any significant difference between the readings obtained in the sitting and lying positions. Certain physical and psychological factors should be considered. Inquiry should be made as to the patient's activity just before the examination, as strenuous exercise may produce changes in the figures recorded. Blood pressure observations taken immediately after meals differ from those taken before meals. There are physiological variations in the level of the blood pressure, so that for research purposes observations should be made with the same relationship to meals, sleep, exercise, and allied factors. A rest period of from 10 to 15 minutes before taking blood pressure readings would eliminate or minimize certain of these factors. Tachycardia in itself sometimes causes a raised systolic pressure. Appreciation of the stress or anxiety through which the patient is passing is important to the examiner. Any appearance of concern on his part may unduly alarm the patient, thereby increasing the pressure. Apart from this, the first reading is often much too high because of the patient's nervousness.

3. *Application of the cuff.*—Venous congestion must be avoided so far as possible; there should be no constricting bands on the patient's arm and the pressure cuff should not be kept inflated longer than is necessary to take the reading; it must be deflated completely before any further determinations are made. In obese subjects special care in the application of the cuff is necessary to prevent bulging. Deflation should be at the rate of about 3 mm. of mercury per second.

4. *The systolic blood pressure.*—If the method of palpation is used before the auscultatory method as recommended, the unusual case with a silent gap will not be missed. In these cases after the first sounds have been heard there is an auscultatory gap below which the sounds reappear. This silent gap is not very uncommon in cases of aortic disease and hypertension.

Recommendations for taking Blood Pressure in Cardiac Arrhythmia and Aortic Valvular Disease

The determination of blood pressure in these conditions is more difficult and the following recommendations are made:

(*a*) Where there are extrasystoles the higher pressure of the beat that follows should be ignored.

(*b*) In auricular fibrillation only approximate blood pressure readings can be obtained; the systolic value should be taken at the point where the majority of beats appear, and the diastolic (if at all) at the point where they become dull and muffled. The American Committee suggest that the average of a series of such readings should be noted as the systolic and diastolic pressures.

(*c*) Alternation in the strength of the beats (pulsus alternans) must be looked for carefully. It must be distinguished from the alternating values produced by regular alternate extrasystoles (pulsus bigeminus).

(*d*) In aortic stenosis with a slow rising or anacrotic type of pulse, auscultation may give a false systolic reading and palpation may be more accurate; often a satisfactory diastolic reading cannot be obtained.

(*e*) In aortic regurgitation with a collapsing pulse the diastolic and point is marked by a less obvious change in the quality of the sounds, which may be difficult to appreciate.

General.—In speaking of the changes which the sounds undergo, the term *points* is suggested for use instead of the commonly used term *phase*, since the latter implies a period of time, whereas the *points* are in fact the precise moments at which one phase changes into the next. The use of a single figure for a pressure that varies so rapidly cannot be accurate to within from 5 to 10 mm. of mercury. For special accuracy several determinations should be made and the highest and lowest should be recorded. If the pulse feels different on the two sides the blood pressure should be taken in both arms. In the presence of unexplained high pressure in the arm it should be taken in the leg also, so that coarctation of the aorta may be detected. A special cuff is necessary to record the blood pressure easily and accurately in the leg. The rubber bag should be 15 cm. wide and its covering should be 17 cm. wide and 30 cm. longer than in the case of the armlet. The patient should be in the prone position with the leg extended and the sounds should be auscultated over the popliteal artery. In detailed researches on blood pressure the use of a basal pressure might be considered after preparation similar to that used for basal metabolism. It should be determined 10–12 hours after the last meal of the previous night, and after resting half an hour in a warmed room. Difficulties in the use of this procedure in practice are obvious, and observations suggest that after 15 minutes the pressure has generally fallen to a basal level. A defect of hearing in the examiner may call for the use of a stethoscope with some form of amplifier.

It is hoped that a critical attitude towards this subject on the part of physicians generally will result from the efforts of these committees, so that every precaution will be taken to obtain conscientious and unbiased records through the use of the standard technique suggested here. These recommendations are not intended to discourage other methods of observation when indicated in special situations.

ROCKEFELLER TRAVELLING FELLOWSHIPS IN MEDICINE

The Medical Research Council announces that it has awarded Rockefeller Travelling Fellowships to the following for the academic year 1939–40:

Guy Blackburn, M.B., F.R.C.S., Demonstrator in Anatomy, St. Bartholomew's Hospital, London.

John Carson Dick, M.D., Assistant Pathologist, University of Glasgow and Glasgow Royal Infirmary.

John Louis Henderson, M.D., M.R.C.P.Ed., Assistant, Department of Child Life and Health, Edinburgh University.

Ronald Stanley Illingworth, M.D., M.R.C.P., D.P.H., Resident Medical Assistant and Clinical Pathologist, Hospital for Sick Children, Great Ormond Street, London.

Robert Manoah Kark, M.R.C.S., M.R.C.P., formerly Demonstrator in Pathology and Registrar to Medical Out-patients, Guy's Hospital, London.

Edward Peter Sharpey-Schafer, M.B., M.R.C.P., First Assistant, Department of Medicine, British Postgraduate Medical School, London.

All the Fellows propose to work at centres in the United States.

TRAVELLING FELLOWSHIPS IN TUBERCULOSIS

The Medical Research Council has awarded Dorothy Temple Cross Research Fellowships to the following candidates intending to study problems of tuberculosis at centres abroad during the academic year 1939–40.

Robert Roger Henderson, M.D., M.R.C.P., Resident Assistant Physician, St. Thomas's Hospital, London.

Arthur Harold Makins Siddons, M.B., M.R.C.P., F.R.C.S., Chief Assistant, Genito-Urinary Department, St. George's Hospital, London.

John Michael Vaizey, M.D., M.R.C.P., Medical First Assistant and Registrar, London Hospital.

THE MAUDSLEY HOSPITAL

OPENING OF NEW EXTENSION

On July 14 the Earl of Athlone, Chancellor of the University of London, opened a new extension of the Maudsley Hospital, Denmark Hill, S.E. The following note, by Mr. R. H. Curtis, O.B.E., chief officer of the L.C.C. Mental Hospitals Department, describes the work of the hospital and the new extensions, which in some respects are the first of their kind in the country.

Origin and Aims of the Hospital

In March, 1908, the London County Council accepted an offer made by the late Dr. Henry Maudsley, one of the most distinguished psychiatrists of his day, to contribute £30,000 towards the cost of erecting and equipping a hospital in London the main objects of which were to be the early treatment of cases of curable mental illness, the promotion of exact research, and the provision of medical teaching in such disorders. An out-patient department and a laboratory were recognized to be essential to the triple purpose of treatment, research, and teaching. Dr. Maudsley believed that the establishment of such a hospital in vital touch with the general hospitals and the University of London would do much to break down the isolation from general medical knowledge and research which had hampered the progress of this important branch of medicine.

The outcome of the Council's acceptance of Dr. Maudsley's offer was the erection on the present site opposite King's College Hospital of the main building of a hospital to which Dr. Maudsley's name has been attached. The building cost nearly £82,000, and it was nearing completion when war broke out, and in May, 1915, with Dr. Maudsley's consent, was lent for the treatment of men with mental disorders arising from war service. It was used for this purpose under the War Office, and later under the Ministry of Pensions, until October, 1920.

On January 24, 1918, Dr. Maudsley died, leaving by his will a further £10,000 to the hospital for research purposes. He had died without seeing the hospital serve the purposes in civilian life for which he had intended it, but the work done there on "shell-shock" cases was in keeping with one part of his broad and far-sighted plan. The clinical investigation and the treatment of these cases were much influenced by Sir Frederick Mott, F.R.S., the first director of the Central Pathological Laboratory, which had been established in the early days of the London County Council's history at Claybury Hospital. The laboratory in 1916 was moved from Claybury to a wing of the new Maudsley Hospital, and therefore it was possible for Sir Frederick Mott to be associated actively with the clinical side of the work of the Maudsley Hospital from its very beginning. When the hospital reverted to civilian use and was formally opened to serve the purpose of its foundation on January 21, 1923, by the then Minister of Health, Sir Frederick was able to continue, in the laboratory, work which he had much at heart.

The first medical superintendent of the hospital was Dr. Edward Mapother, F.R.C.P., F.R.C.S., who still holds the appointment. He had had previous experience in the Council's mental hospital service, and at the Maudsley Hospital itself, where he had acted as medical superintendent during its use by the Ministry of Pensions.

The hospital was originally designed to hold 108 beds, a number gradually increased to 200. The first large extension, comprising a considerable alteration of existing buildings and the provision of additional buildings, was brought into use in September, 1936. It included a new out-patient department, special treatment blocks, an extension of accommodation for the Central Pathological

Laboratory, an operating theatre, and improved domestic sections. The second extension, now opened, comprises blocks for private patients in single rooms and a block specially designed for the in-patient treatment of children, with adequate accommodation for a separate children's out-patient department.

Dr. Maudsley wished the hospital to serve a triple purpose: research, teaching, and treatment. A word should be said about the fulfilment of each of these functions.

Research at Maudsley

From the beginning it was recognized that research was one of the essential functions of the medical staff of the hospital, and during the last fifteen years substantial contributions have been made from the hospital to the progress of psychiatric knowledge, supplementing the more purely pathological research which has been initiated and fostered in the Central Pathological Laboratory, so happily housed in close association with the hospital. The Rockefeller Foundation has given generous support to research work at the hospital and the laboratory since 1935, when a grant of £3,000 a year for three years was made to finance investigations, one-half of it to be spent on research under the control of the director of the laboratory, one-half to be under the direction of the medical superintendent of the hospital. In 1938 a further grant of £5,000 a year, to be continued for five years, was made by the Rockefeller Foundation, and this is divided equally between the laboratory and clinical research, as before. These and other benefactions of the Rockefeller Foundation have led to increased activity in research, which must be for the benefit of psychiatry as a whole. The Commonwealth Fund of America also has contributed in the past a substantial sum for research fellowships at the Maudsley Hospital.

Clinical and Laboratory Teaching

Since 1924 the hospital has been a school of the University of London, and since 1936 the medical superintendent of the hospital and the director of the central laboratory (at first Dr. F. L. Golla, F.R.C.P., who succeeded Sir Frederick Mott, and since the beginning of the present month Dr. Samuel Nevin, M.R.C.P.) have held university chairs in psychiatry and in the pathology of mental disease, respectively. For twenty-two years the hospital and the central laboratory have furnished annual courses of instruction to postgraduate students who have offered themselves for a diploma in psychological medicine. Other courses of instruction have been arranged for special groups, and the practice at the Maudsley Hospital has been attended largely by psychiatrists from all over the world. A close liaison with its near neighbour, King's College Hospital, has enabled the medical superintendent of the Maudsley Hospital to share in undergraduate teaching in psychological medicine at King's College Hospital. The Maudsley staff have been associated also with the instruction offered by the British Postgraduate Medical School at Hammersmith. It is this association of the hospital and of the central pathological laboratory with university teaching which lent special appropriateness to the acceptance by the Chancellor of the University of London of the invitation that he should perform the opening ceremony on July 14.

Treatment of Incipient Mental Disorder

From 1915, when the Council obtained, by means of private legislation, authority to treat at the Maudsley Hospital any persons suffering from incipient mental infirmity who might voluntarily desire such treatment, and to defray the expenses thus entailed, it was intended that the Maudsley Hospital should be a pioneer in the direction of voluntary treatment. Indeed, when the hospital was opened for civilian use in 1923 it represented the first provision made by a public body in England for the treatment of early and recoverable types of mental disorder on a voluntary basis and apart from the certified insane; for the London County Council, having secured its special powers, decided that none but voluntary patients were to be received in the Maudsley Hospital, and that decision is still operative. Thus it has been possible for the hospital, from the beginning, to provide treatment for a great number of those neurotic patients whose illness represents so much human suffering and so much social loss, who probably would not come under the care of those who work exclusively in mental hospitals.

All aspects of the hospital's work have grown enormously from small beginnings. Thus the number of new out-patients, including children, seen in one year is now upwards of 4,000, whereas in 1924 it was only 894. Out-patient treatment represented another pioneer development of work in a public mental hospital. The number of in-patients admitted to the hospital in a year is now between 800 and 900.

The New Blocks

The small provision originally made for treatment of private patients in single rooms has long been appropriated for other purposes, and the need for adequate private accommodation has been felt for some time. The new blocks now opened include a building of two wings designed to meet the needs of the persons who desire treatment but may find it not altogether congenial to receive it in association with other patients in open wards, and are prepared to pay a charge which will cover the cost to be incurred by the Council in providing separate accommodation and care in single rooms. The structure and organization are such that very careful classification will be possible, and no patient will have to be treated in the neighbourhood of others whose illness is of a different, and possibly disturbing, type. No patient will be admitted who does not come in of his own free will and desiring treatment. Patients will not be received unless the outlook for recovery is good. There is no intention of receiving chronic patients or retaining those whose conduct would be likely to disturb others.

The new private patients' building has its own attractive garden, which separates it from the original hospital buildings, except for subway communication which gives access to rooms for occupational therapy and physical treatment, gymnasium, entertainment hall, billiard room, and library. An attractive roof garden has been planned which will cater specially for those who need greater privacy than a downstairs garden, overlooked from above, will provide. The facilities for investigation and treatment of patients will be complete, from psychotherapy at one end of the scale to insulin treatment or continuous narcosis at the other.

The special association of the Maudsley Hospital with King's College Hospital ensures that all types of specialized advice and treatment in branches of medicine other than psychiatry are available. Members of the honorary staff of King's College Hospital act as consultants to the Maudsley Hospital.

The new children's block is a completely new departure, for nowhere in Great Britain is there specialized in-patient accommodation for children whose troubles need psychiatric investigation and treatment. In spite of the great development of child guidance and child psychiatry generally, the lack of adequate in-patient facilities hitherto has been a conspicuous defect of British psychological medicine. To meet this, and to provide adequate and separate accommodation for an out-patient clinic for children, hitherto carried on in the same building as the adult out-patient department, a special detached block has been constructed. It is planned to meet the needs not of the backward or mentally defective child but of the far more difficult case of the nervous child with conduct disturbance that calls for close individual attention. The out-patient department of the new building is already fully at work; the residential accommodation is not yet occupied.

LONDON HOSPITALS IN WAR TIME

Dr. Walter Elliot, the Minister of Health, on July 13 conferred a second time with representatives of the governing bodies of the London voluntary hospitals, who were accompanied by some of the medical group officers and the lay sector officers appointed under the Ministry's Emergency Hospital Scheme.

Dr. Elliot said that he had carefully considered the representations made on behalf of the hospitals at the conference he had with them on July 4 and in the memorandum they had submitted for discussion that day. Those representations related to a number of points on which the representatives of the hospitals urged that an immediate decision was necessary and on which, in their view, the present organization was open to criticism. In particular they asked for the appointment of one man of standing in close touch with voluntary hospitals who would deal with both the medical and the administrative side of the London emergency hospital organization, be responsible for the progress of the scheme for the London area as a whole, call together those concerned and require reports of progress, establish some sort of time schedule and investigate difficulties, and if possible have some financial powers to override minor difficulties.

Machinery for Report and Consultation

The Minister said that he had come to the conclusion that the best method of meeting these suggestions would be to institute a system of regular weekly meetings of the two groups of officers concerned, and of a smaller body representative of them both, which would meet under the chairmanship of the Permanent Secretary of the Ministry, who was, under the Minister, responsible for the administration and financial arrangements of the Government's scheme for the treatment of casualties. In detail, what he proposed was that Dr. Hebb, the Director-General of Emergency Medical Services at the Ministry, would meet the medical group officers every Monday, that Mr. Neville, the Principal Assistant Secretary in the Ministry responsible for the administrative side of the scheme, should meet the lay sector officers every Tuesday, and that the chairman of the group officers, Sir Girling Ball, and the chairman of the lay sector officers, Sir George Cory, should meet Sir George Chrystal, the Permanent Secretary of the Ministry, every Wednesday. At this last-mentioned meeting Sir Frederick Menzies, the Chief Medical Officer to the London County Council, which was, of course, responsible for a very great number of hospital beds in the London area, would also be present.

In this way systematized machinery would exist whereby difficulties and matters requiring decision could be brought forthwith before Dr. Hebb and Mr. Neville and, if they could not then be decided, immediately thereafter to Sir George Chrystal, who would report after each of his Wednesday meetings to the Minister on matters of policy. Thus the Minister would himself deal direct with London's special problems.

Transport of Staff, Equipment, and Patients

Dr. Elliot went on to discuss the points of difficulty raised by the hospital representatives in the memorandum they had submitted. With regard to the transport of personnel and equipment, he announced that arrangements were being made with the London Passenger Transport Board for the provision of sufficient "Green Line" coaches to convey nurses and other personnel who had to be transferred from the central London hospitals to the outer parts of the sectors. With regard to equipment, it had been arranged that six 5-ton lorries would be available for each sector for the initial removal, and that two of these vehicles should be retained in each sector for permanent use during the emergency. With regard to the ambulance arrangements which would operate after the emergency had commenced, detailed operation orders would be issued to individual voluntary hospitals in the London area next week. On the subject of expenses of sector officers, the Minister said that if the allowances which had already been notified proved to be insufficient, he would be prepared to add to them to such extent as proved to be reasonable and necessary when the hospitals had submitted details. He went briefly into the numerous other points set out in the memorandum.

The hospital representatives, in thanking the Minister for meeting them so promptly, said that they thought that the new machinery which he had suggested would go a long way towards meeting the immediate situation, and should be given a trial. They feared, however, that the Minister might find it impossible, owing to his other burdens, to continue permanently to play the personal part he had indicated.

Since the conference reported above Sir Bernard Docker, chairman of the Westminster Hospital, has accepted an invitation from the Minister to represent the chairmen of the London voluntary hospitals on the committee which is to meet weekly under the chairmanship of Sir George Chrystal to direct the hospital organization for treatment of casualties in the London area.

THE WAR ON NERVES

NATIONAL SERVICE A REMEDY

At the sixteenth annual meeting of the National Council for Mental Hygiene, held on July 11, Sir WALTER LANGDON-BROWN delivered a brief address which he entitled "Some Emotions and a Moral." He began with some remarks on mass psychology and the moral which recent and present events carried for those interested in mental hygiene. If we were not actually at war, he said, we were not at peace. The production of nervous attrition was being followed deliberately as an aggressive policy in certain quarters, and therefore it was necessary to develop new methods of mental defence. To insist, as some communities did, on utter obedience to the force of authority apparently simplified the task of co-ordinating the independent units into a coherent whole, but at what ultimate cost to the nation and to the individual? Everyone was aware of the effect of undue repression in the individual life, whether autonomous or imposed by parental or scholastic authority; it made for psychoneurosis and perversion, and one could hardly avoid at the present time drawing parallels between the psychoneurosis of individuals and that of nations. Sir Walter Langdon-Brown proceeded to speak of the motive force of fear, originally a defensive mechanism. When fear became unreasoning it was a perversion of such mechanism. Fears formed such a large part of the sufferings of the neurotic that it was worth while to consider the manner in which fear was evoked. The sympathetic nervous system, which superintended many functions of organic life, retained some of the primitive features of the nervous system of lower animals. The condition of continued fear, whether recognized or not as such by the sufferers, was capable of producing the symptoms of which they complained. Why did the neurotic refer so many of his symptoms to disorders of various organs? It was a case of emotional disturbance leading to widespread preparation for imminent activity, and the activity never found its occasion, but the disturbance persisted. What was now being witnessed in the international situation was a deliberate attempt to exploit mass psychology by manifold suggestions calculated to excite fear, and thus evoke a defeatist attitude. Fear was closely associated with the same nervous mechanisms as those which prepared the body for action, and, in general, fear was intensified if action did not result. If fear could be mobilized into defensive action, to a large extent it would

cease to be felt as fear. Every surgeon knew that occasionally—not so often now as formerly—a medical student who was merely watching an operation would faint. But he also knew that that did not happen if the student was allotted some duty, however minor. The best antidote against this long-drawn-out war on the nerves was active co-operation in some form of national service.

In conclusion Sir Walter Langdon-Brown said how impressed he had been on reading the life of Alfred Adler, a man whom many of them only knew in his later years, and who appeared to be perfectly adjusted save in one particular—that he had a tendency to doubt the loyalty of his followers. Yet it was evident from a study of Adler's earlier life that he had to fight and overcome a number of neurotic tendencies. Alfred Adler was an outstanding illustration of the fact that much of the good and creative work of the world was accomplished by neurotics, men who had come to understand themselves, and had turned what might have been their grievous failing and misfortune into a means of helping and inspiring others. It was a reassuring thing in these days to know that there survived a real aristocracy—the aristocracy of the sensitive, the considerate, and the courageous. It was a rainbow token that, after all, civilization would not be wholly submerged beneath the rising flood of barbarism.

Sir Walter Langdon-Brown's address was preceded by a business meeting, at which a report was made stressing various useful activities. A special emergency committee is considering the compilation of syllabuses and synopses of training lectures for persons, such as A.R.P. workers and nurses and any who would be in authority in a time of crisis, in order that they may have some knowledge of the psychological problems which might be encountered, especially in connexion with the evacuation of the civil population and service at first-aid posts. The Council has also been considering the problem of suicide with a view to the drafting of a Bill to amend the anomalies of the law on this subject.

THE CANCER CAMPAIGN

Viscount Hailsham presided at the seventy-first quarterly meeting of the Grand Council of the British Empire Cancer Campaign, held on July 12.

The following grants were approved: £400 to Mount Vernon Hospital for the employment of Professor F. Weigert while carrying out research on a special biochemical problem; £495 to the Strangeways Research Laboratory, Cambridge, for the salary of its physicist, Dr. D. E. Lea, and £400 to Sir Robert Muir and Dr. P. R. Peacock for a scheme of research to be carried out at the Glasgow Royal Cancer Hospital by Dr. Stephan Beck. This brings the total grants made to date by the Campaign for cancer research for the year 1939 to over £49,000. Lord Hailsham has permitted the prize of £100, which is being offered for the best essay on certain branches of clinical research, to be named "The Hailsham Prize."

Approval was given to the formation of a University of Cambridge Research Centre of the British Empire Cancer Campaign. The initial committee to supervise this centre will consist of the Vice-Chancellor, Professor H. R. Dean (professor of pathology), Professor J. A. Ryle (regius professor of physic), Sir Frederick Gowland Hopkins (professor of biochemistry), and Miss Honor Fell (director of the Strangeways Research Laboratory), augmented later by other scientists at Cambridge. In future this centre will co-ordinate all the cancer research being carried out at Cambridge, and will itself initiate and direct research in the same way as the recently formed University of Oxford Research Centre.

Grand Council acceded to the request for affiliation from the Cancer Research Fund Committee (1934) of Northern Ireland, which now provides a link between the work of the Campaign and the cancer research being carried out at the University of Belfast and in Ulster generally.

MENTAL HOSPITALS ASSOCIATION

At the annual meeting of the Mental Hospitals Association, held at Guildhall on July 6, with Mr. J. W. BLACK in the chair, Sir LAURENCE BROCK, chairman of the Board of Control, spoke on the general position of the public mental health services. He said that although the aggregate shortage of beds had been reduced by some 600 the position remained serious and must in the next two or three years become worse. Progress at Lathom Park and Margaretting was slow, and no contract had yet been let, and in Kent the site for the proposed third mental hospital had had to be abandoned owing to the difficulty of drainage. On the other hand, steady progress continued to be made in the provision of admission units and nurses' homes. Even where the discharge rate was unaffected the relapse rate fell when an early treatment centre was opened. Patients entered the mental hospital in much better condition and with a considerably smaller likelihood of return. An indirect advantage, not always appreciated, was the stimulating effect exerted on the medical staff by the provision of modern treatment facilities. The staffing of mental hospitals was still very inadequate, and he welcomed the action which the association were taking to improve it. Continental hospitals were much more adequately staffed: the Waldau University, Switzerland, had ten medical officers for under 1,000 beds and out-patient services. Clinics made a great demand on the time and energy of the mental hospital officer, and an increase of staff would facilitate a most necessary reform: an increase in the number of sessions and the provision of more treatment.

Problems of the Divorce Law

Mental hospitals continued to be perplexed at the uncertainties of the Matrimonial Causes Act, 1937. The case of Shipman *v.* Shipman[1] was complicated by the use of a wholly extra-statutory form releasing the patient on what was called provisional discharge. During the five-year period immediately preceding the petition the patient was absent for several lengthy periods aggregating nearly 400 days. In substance the result of the learned President's judgment was that short absences such as week-end leave might be disregarded, but there must come a point at which absence of control breaks the continuity of the "care and treatment" required by the Act. In certain cases the Shipman judgment might cause the medical officer some embarrassment. Its scope had, however, been narrowed to a slight extent by the judgment in Green *v.* Green.[2] The patient in that case had been sent for a fortnight from a London County Council hospital to a home managed by the Mental After-Care Association as agents of the Council; he was under some measure of control, and only L.C.C. patients were at that time admitted. The President had held that the period of detention had not been interrupted. The duty of the medical superintendent of a public mental hospital was perfectly clear: he must be guided solely by the interests of the patient. While it would obviously be unwise to do anything which obstructed divorce proceedings, he ought not to be deterred from doing what was best for the patient by any consideration of the legal consequences to other persons. The medical officer of a licensed house was in a far weaker position, for his wishes might be negatived by the petitioner's right to withdraw the patient. Sir Laurence Brock hoped that the obscurities of this part of the law might be cleared up before long. Amendment could only, in his opinion, follow one of two lines: either the right to divorce must be made to depend on a certain period of continuous detention, or the Scottish presumption must be introduced that a patient who has been under treatment continuously for a given time is of unsound mind unless the contrary be proved.

[1] *British Medical Journal*, 1938, **2**, 1394.
[2] Ibid., 1939, **1**, 1264.

Dealing with air raid precautions in mental hospitals, Sir Laurence said that if only a short interval could be expected between the warning and the air raid, to attempt to transfer patients to trenches would be worse than useless. Any expenditure on evacuated hospitals should be met from public funds: the local authority should neither gain nor lose from giving up buildings. Measures necessary for the protection of patients and staff must, however, be a local charge. In conclusion, he pointed to a danger of too much concentration on end-results. The duty of the visiting committee should, he said, not be limited to provision of beds. They should survey the field as a whole and frame a comprehensive programme which would aim, wherever possible, at prevention. At the moment nothing was more important than the development of mental out-patient centres. The national emergency must not lead to any sagging of the health services. To neglect the mental health of the nation would not add to the strength of national defence.

The Matrimonial Causes Act, 1937

Dr. T. C. GRAVES opened a discussion on this Act in its relation to mental hospital practice. He observed that unless the recommendation for temporary treatment was an "order" the year which might be occupied by temporary treatment would not count in the five-year period necessary before the petition. If the recommendation was an order, then the patient might as well be certified. The Act did not enhance the popularity of mental hospitals, and undoubtedly increased the stigma on the "detained." It might well be a factor in determining relatives to apply for discharge before the patient was really well enough. Visiting committees should take a personal interest in patients who were made respondents to a divorce action, and review the circumstances of their illness and detention; such a review would greatly support the medical officer who had to give evidence. The distinction between voluntary and temporary patients on the one hand and certified patients on the other was wholly arbitrary, had no medical basis, and now was very unfair. The Mental Treatment Act, 1930, should be amended, so that apart from really voluntary admissions all cases should come into mental hospitals on a temporary recommendation for an adequate time, and the present legal obstacles to temporary treatment should be removed. Further disposal should be decided by the Board of Control. Even after a medical officer had testified that the patient was incurable he should maintain and exhibit an active interest in the patient's well-being and possible recovery.

The meeting referred the question of amendment of the law to the Executive Committee, for discussion with visiting committees and report.

The Board of Registration of Medical Auxiliaries was formed by, and is composed of, representatives of the British Medical Association, the Society of Apothecaries of London, the Chartered Society of Massage and Medical Gymnastics, the Society of Radiographers, the Association of Dispensing Opticians, and the Chiropody Group Council. The last-named organization was formed by the Board to act as the qualifying body to control and regulate the entry of chiropodists to the *National Register of Medical Auxiliary Services*, which is published by the Board. In future all chiropodists who satisfy the requirements of the Board will be enrolled through the Group Council, and thus the public and the medical profession will be able through the published register to obtain the services of a chiropodist whose training and ethical standards have been assessed and approved by the Board. The *Register of Chiropodists* is supplied free to members of the medical profession, and members of the public may obtain it on payment of 2s. It is published by the Board of Registration of Medical Auxiliaries (B.M.A. House, Tavistock Square, London, W.C.1). The names are arranged topographically, with an alphabetical list at the end.

Reports of Societies

HEPARIN IN THROMBOSIS AND EMBOLISM

At a meeting of the Section of Surgery of the Royal Society of Medicine, to which members of other Sections were invited, on July 6, Mr. C. H. S. FRANKAU presiding, Dr. GORDON MURRAY of Toronto gave an address on "Heparin in Thrombosis and Embolism," and showed a film entitled "The Formation of a Thrombus." Dr. Murray is a co-worker with Professor C. H. Best, an article by whom in the *British Medical Journal* of November 12, 1938 (p. 977), described the preliminary work in this field.

Dr. Gordon Murray reminded the meeting that heparin was first isolated by McLean in 1916 and demonstrated as an anti-coagulant. In 1931–2, when he (Dr. Murray) was struggling with some work on blood-vessel anastomosis, and found that most of his failures were due to thrombosis, it was suggested to him that Best had a substance named heparin which would prevent the clotting of blood. Best and he forthwith began to investigate that side of the problem. Their preparation of heparin was made from beef lung, 100 lb. of which were taken to provide one gramme of heparin. The substance was the strongest organic acid known, and much work had to be done before it was finally produced as a crystalline barium salt. It was uncertain what happened to heparin after administration. The analysis of certain tissues and excreta had not yielded much evidence concerning its breaking-up. The only positive evidence on analysis was some increase of heparin of the small and large intestine.

As it was supposed that some day a clinical use might be found for this substance, successful efforts at purification were made, and from the purified heparin the toxic properties disappeared. To investigate the action on thrombosis, occlusion of the superficial vein was produced in dogs by a certain technique, but when heparin was given the vessels remained patent in 80 per cent. of the cases, or, when the technique became more refined, even in 90 per cent. Dr. Murray described the successive experiments which were followed out, including the grafting of a vein into an artery. The trouble with such grafts was thrombosis at the suture lines and the irregular interior of the vein. If heparin was not given thrombosis was found to occur within a few hours, but if the animal was heparinized satisfactorily over a period of from seven to ten days the grafts all remained patent.

The action of heparin was next investigated in relation to embolism, and the results were such as to offer some hope of clinical usefulness. Experiments were also carried out on the portal system. In 90 per cent. of the control cases the vein became occluded with a thrombus, but with heparin all the experiments resulted in a patent vein, showing that heparin was active in the portal circulation. Thanks to heparin it was possible to transplant organs without difficulty.

Clinical Applications

Having thus demonstrated that heparin would prevent thrombosis, it was decided to try it on patients. Dr. Murray illustrated the method of administration into a superficial vein. There was no sensation from the heparin, and no toxic effect. Out of 400 clinical cases now treated no toxic effects with the purified form of heparin had been recorded. The cases included a large number of post-operative administrations in the attempt to prevent pulmonary embolism. Major operations such as gastrectomy and the like were well represented in the series. Among these the post-operative mortality from pulmonary embolism had been found to be between 2 and 7 per cent., but among the heparinized cases there was no mortality from this cause. He also stated that there was no negative phase in the giving of heparin; everything was normal after the clotting time had been brought down. But all

that heparin did was to prevent the extension of thrombosis; it did not absorb a clot already formed.

When a patient, post-operatively or otherwise, had developed an embolism, what was the best course to take? The workers in this subject were quite aware that in those cases which had one embolism there were practically certainly other clots in the vessels waiting to be discharged, and it was doubtful whether in such cases heparin could be of value. But it was decided to try it, and now there were twenty-two cases in a series of repeated pulmonary embolisms all of which had survived after heparin, and, with one possible exception, had had no further embolism. It was well known that without heparin patients did recover from pulmonary embolism, but at all events in this series there were no deaths. Certain of these patients had died from other causes, but on post-mortem examination no sign of embolism was found.

The next clinical application was to the portal system. Up to date six cases of mesenteric thrombosis had been treated with heparin. Four of them were alive and well after a resection of the intestine varying from 18 inches to 7 feet. In the other two cases, in which the treatment was given late, the patients died, but at necropsy no extension of thrombosis or gangrene was found. Heparin had been given in several cases following splenectomy. The mortality after such an operation was very high, and in the experience of their clinic practically always from thrombosis in the mesenteric system, but the few patients who had been treated with heparin had survived and had not had thrombosis. The cases of coronary thrombosis treated in this way had been too few for conclusions to be formed, but a question which no one had answered to his satisfaction was whether the coronary artery was completely occluded at the beginning of an attack or not. If it was not occluded the giving of heparin might prevent occlusion. In the few cases which had been treated it was perhaps worth noting that the clinical and electrocardiographic findings did not follow the usual course of coronary thrombosis; he was inclined to think that heparin had nothing to do with that, but it was a point that wanted further investigation.

Still Experimental

All this work (Dr. Murray concluded) was still in the experimental stage. There was not a single bit of it on which he wished to make any final statement. The work was proceeding and the technique was being improved. Heparin treatment was started within from four to twenty-four hours after operation. That allowed time for ordinary clotting to take place, and by that course heparin would not be blamed for haematomata. In a group of cases with heparin there were no more haematomata than in a parallel group of cases without. The point at which heparin should be stopped was, again, a matter of choice. At present it was their custom to proceed until the conditions which contributed to producing thrombosis had disappeared. When the patient's blood pressure was normal, when his incision was healed, when he could breathe deeply with comfort, when he could turn round in bed, when his gastro-intestinal and urinary functions were normal, when, in short, he had become again an energetic person, heparin was discontinued. This took up to ten days or two weeks in the average case.

He thought there was evidence that heparin was not toxic, that it prevented thrombosis in animals and human beings, that it was most valuable in operations on blood vessels themselves, and that it was probably of great value in diseases where thrombosis was a factor.

In the film which was shown Dr. Murray pointed out that, apart from acting against thrombus formation, heparin appeared to have some specific effect on the blood platelets.

Discussion

Mr. G. GORDON-TAYLOR said that this was evidently a therapeutic preparation of great value to surgeons in general, though he had not yet himself had an opportunity of using it. He did not share Dr. Murray's pessimistic views about the results of surgery in mesenteric thrombosis. He had perhaps been fortunate himself, but about half the cases of resection for mesenteric thrombosis in his experience had lived, and in some of them the resection had been very extensive.

Sir JAMES WALTON paid a tribute to a brilliant piece of research, carried out rapidly and successfully. He had had the opportunity of seeing something of it during a visit to Toronto.

Mr. DICKSON WRIGHT said that in some experiments he had carried out he had found heparin to have a definite effect in preventing thrombosis. He had also used heparin for several patients who were suffering from thrombosis, but he gave it up on account of the severe rigors produced. The whole secret of success in this research had been in the preparation of a pure heparin. He was sure that the material he had used contained many impurities; it was a dark-brown powder which went into solution with difficulty. He wished to know whether there was any method of estimating the heparin content of the blood, and, if so, whether it was found to be low in certain cases when thrombosis was threatening. He also referred to the fact that proneness to thrombosis was to some extent familial. A woman on whom he operated recently for perforated appendix had two sisters who had died from pulmonary embolism after operations. This woman had had various attacks of thrombosis, and therefore, apart from using heparin, every possible precaution was taken. She had three large pulmonary emboli, but eventually got well; in such a case he was sure the use of a purified heparin would have saved all anxiety. He also asked whether Dr. Murray had had the opportunity of treating thrombophlebitis migrans, in which over a period up to three years in some cases thrombi kept on developing, necessitating that the patient be laid up for a very long period.

Mr. VICTOR RIDDELL said that he had had the opportunity this year of doing three peripheral embolectomies—popliteal, external iliac, and aortic bifurcation—and put the patients under heparin. The "popliteal" patient died next day from pulmonary embolus in spite of heparin; the other two recovered. What was the dosage to be employed in attempting to double the clotting time? With regard to blood transfusion, the disadvantage of the use of heparin in this connexion was its expensiveness, and also the fact that the donor would have to be kept waiting about in hospital.

Dr. R. V. FACEY said that he had used heparin on only three occasions, but each time the patient had survived. One case was a man of 63 who had had an attack of coronary thrombosis, confirmed by electrocardiogram. He recovered from the pain of the thrombosis, but developed intracardiac clots, and had two attacks of pulmonary embolus, and then a very sudden attack in which the left femoral artery was occluded. The limb remained warm, and the peripheral capillaries maintained their circulation quite well. The patient was heparinized for a fortnight—which incidentally cost him £40. After about a week his leucocyte count came down and his limb had returned to normal size; that was about a month ago, and he seemed to be doing quite well. Had heparin been used in septicaemia? He had been asked to see a woman with "white leg" who, in spite of full doses of sulphanilamide, continued to get worse. She was really *in extremis* when he saw her. He determined to try heparinizing and then transfusion; there was a most remarkable change, and she went on to make a perfect recovery. The third case was that of a young woman who had a carbuncle of the lip. Staphylococci were found in the blood. She had been under M & B 693 for two days, in good doses—he thought it was two tablets four-hourly—but in spite of this she got worse. He heparinized her, because it seemed to him that in cases of staphylococcal septicaemia characterized by presumably septic clots travelling about the body heparin might possibly have useful preventive properties.

Lecturer's Reply

Dr. GORDON MURRAY, replying on the question of estimating the heparin in the blood, said that the technique of assay for heparin was rather difficult. Such an assay was now possible seeing that it had been found that heparin and protamine combined in a certain proportion. It was still not easy, however, to assay within a low percentage. Heparin had been demonstrated to be produced in Ehrlich's mast cells, which occurred definitely in relation to blood cells. After certain stimulation like anaphylactic shock these cells shrank and apparently discharged a great deal of their heparin content. Some areas were free of them and others were rich. For example, the cornea and surrounding area was very rich in mast cells. So far there was no method within his knowledge which would predict the case likely to develop thrombosis. In thrombophlebitis migrans heparin had the same effect as in other conditions in the acute phase, but it did not prevent a future attack. Five cases of this type all responded, but three out of the five had recurrences at the usual time.

The required dosage of heparin varied considerably with the patient, and so far it had not been possible to name a single figure which would give the effect in any particular case. The effect was gauged by the level of the clotting time. A base-line of clotting time was determined for each patient, and the aim was to double or treble that period. In the average case, depending on size, weight, and so on, it had taken between 750 and 1,000 units per hour. He was speaking of the Toronto preparation; in the preparation made in Stockholm the dosage was estimated by weight, and it was at present difficult to apply a common measure to the two.

On the subject of price, he hoped that some day a chemist would produce a synthetic product which would be cheap. It was a laborious process, with a small yield from a large amount of material, requiring fairly expensive chemical agents and a large amount of work, and it was doubtful whether the price of the substance as at present produced could be greatly reduced.

ALCOHOL AND DRUG ADDICTION IN RELATION TO CRIME

A paper on the problem of alcohol and drug addiction in relation to crime was read by Dr. W. NORWOOD EAST, formerly H.M. Commissioner of Prisons, at a meeting of the Society for the Study of Inebriety, presided over by Mr. ARTHUR EVANS, on July 11.

Dr. Norwood East began by offering some statistics in a field where statistics are plentiful but possibly fallacious. The most interesting concerned a statistical study of the factors associated with criminal conduct in the case of 4,000 youths at Wormwood Scrubs Prison during the period 1930–7. In this investigation it was found that there was a history of drunkenness on both sides of the family in about 3 per 1,000; drunkenness on the part of the father alone in 39 per 1,000, on the part of the mother alone in 6 per 1,000, and on the part of other relatives in 4 per 1,000—altogether a family history of drunkenness in just over 200 of the 4,000 youths. Lads with a record of offences against the person or against discipline alone were found to have a drunken father in a statistically excessive number of cases. The sexual offences group revealed a slight excess of cases with a family history of drunkenness, but not enough to be statistically significant. The proportion of lads with a family history of drug addiction was only 2.25 per 1,000.

Social Tendencies

It would appear evident that parental alcoholism favours delinquency. On the other hand, as Dr. East pointed out, it is by no means uncommon for the children of alcoholic parents, warned by their example, to be total abstainers. The position with regard to alcoholism and crime in this country is very different from what it was thirty years ago when Lord Alverstone, then Lord Chief Justice, declared that 90 per cent. of the crime was caused by indulgence in strong drink. In pre-war years drunkenness was a serious element in the problem of recidivism, but this has been greatly reduced owing to restriction of licensing hours and increase in the price of liquor, as well as by advances in the standard of life and education.

Dr. East went through his notes of a series of 100 men and youths who had been tried for murder in post-war years—ninety of them during the last ten years—and found that alcohol was a predominant or contributing cause in nineteen. Dr. H. A. Grierson, senior medical officer of Brixton Prison, from a consideration of 137 cases of attempted suicide, had estimated that alcohol was a contributing factor in not more than 26 per cent. Dr. East had no figures regarding the relation of alcohol to sexual crimes, but some years ago, investigating the mental factors associated with exhibitionism, he found only nine alcoholic cases in a series of 150 men charged with the offence. The association of alcohol with prostitution might be due to the habit of taking alcohol to nullify social inhibitions. A recent Copenhagen study stated that drunkenness was found to obtain in 18.6 per cent. of the fathers and 1.8 per cent. of the mothers of some 500 prostitutes. As a result of eight years' work among women prisoners in Manchester and Liverpool Dr. East had no doubt that many young women took alcohol to enable them to accost their clients. From the various social statistics it might be concluded that some importance must be attached to the association of alcoholism and crime, but that it was easy to over-emphasize the connexion. As a Swedish worker said, social problems are very indirect, and simple solutions have so far always been found wanting.

Medical Aspects

Turning to the medical aspects of crime committed in the alcoholic state, Dr. East pointed out that alcohol might give rise to a very short attack of mental disorder after a drinking bout, as in mania à potu; to a more prolonged disorder lasting some days, as in delirium tremens; or to the chronic alcoholic psychoses which might persist as chronic insanity or from which the patient might recover. He believed that the amount of crime due to alcoholic insanity was considerably less than before the war. Professor E. Mapother and Dr. Aubrey Lewis had said that the incidence of alcoholic psychosis in London had fallen to one-third of what it was in the pre-war period.

Criminal conduct was obviously favoured by the abnormal mental condition resulting from drunkenness itself, apart from insanity. The impairment of reason, the failure to appreciate consequences, the emotional disturbance, the divorce from reality, together with the loss of inhibitory capacity, accounted for many alcoholic crimes, and the aphrodisiac action of alcohol, combined with its narcotic effect on restraint, often resulted in sexual offences. There was a tendency in some persons for future alcoholic crime to be of the same pattern as a previous alcoholic offence, thus resembling some cases of epileptic crime. For example, a happily married man with a considerable private income was a courteous gentleman until he became addicted to alcohol and went through two attacks of delirium tremens. He was later sentenced to penal servitude for committing rape when under the influence of alcohol, and he had been previously convicted of a drunken sexual offence. The resemblance between alcoholic and epileptic crime might go further if there was no recollection afterwards of the criminal conduct, and if an epileptic subject had taken alcohol before committing a crime the diagnosis between alcoholic automatism and epileptic automatism might be almost

impossible. These and similar cases illustrated the well-known tendency of the alcoholic to disconnect anti-social traits from personal control.

Legal Considerations

Dr. East pointed out the difference between police court cases in which persons appeared on a charge of drunkenness, and in which the question of drunkenness had usually been considered by the medical witness shortly after the arrest, and the more serious forms of crime in which the indications of recent intoxication might have entirely passed away before the offender came under medical observation. He paid a tribute to the police surgeons of large cities for their experienced diagnosis of drunkenness, and entered into some discussion of definitions, quoting the report of the Select Committee of the House of Lords on the prevention of road accidents, and the report on alcohol by the committee of the Medical Research Council.

In former times voluntary drunkenness was not accepted as an excuse for crime, because it was held that the defendant did wrong in getting drunk. An offender under the influence of drink could derive no privilege from a madness voluntarily contracted. Later, however, legal opinion had altered, and it had been ruled that upon an indictment for murder the intoxication of the accused might be taken into consideration as a circumstance to show that the act was not premeditated. He quoted at length the finding in the well-known Beard case, which found its way to the House of Lords in 1920. The law was rather paradoxical on this point. If drunkenness was pleaded in mitigation of a crime it was for the defendant to produce evidence of his intoxication; but if he was charged with drunkenness, whether simple or with aggravations, it was for the prosecution to prove that he was intoxicated. If he was charged with being under the influence of drink or of a drug to such an extent as to be incapable of exercising proper control of a vehicle, it was for the prosecution to prove not only the influence of the drink or drug but that incapacity resulted therefrom. Thus in some offences the accused endeavoured to prove that he was drunk and in others that he was sober at the time the illegal acts were committed. Moreover, as Mr. Everard Dickson had pointed out, the law treated those who were in the second stage of drunkenness, the hilarious or quarrelsome stage, with more severity than those who had reached the last stage of all, the stage of drowsiness and of being incapable.

Treatment of Addiction

The treatment of alcohol and drug addicts guilty of major crime presented no special difficulty, as the sentence imposed was usually long enough for sufficient withdrawal of the drink or drug as well as for general or special medical treatment. The problem was more difficult in the case of petty crime associated with alcohol or drug addiction, as the sentence, although sufficient for the crime, was usually insufficient for the completion of the three stages of treatment—namely, the stage of deprivation lasting a few days, the stage of convalescence lasting a few weeks, and the stage of readjustment lasting some months and running into the indefinite period required for after-care on release. Drink was always available for the alcoholic offender when at liberty. Narcotic drug addicts had much more difficulty in obtaining their drug of addiction, but the sentences imposed for offences under the Dangerous Drugs Acts and Regulations, although often substantial, had not usually proved effective in curing the addict in spite of medical treatment during imprisonment. The position was further complicated by the failure of many addicts, like many alcoholics, to persevere with voluntary treatment, and compulsory detention must be prolonged in order to be effective. Dr. East quoted some figures from the Atlanta Reformatory, where it was found that the relapse rate among addict prisoners detained for less than a year was 90 per cent., but in cases where the stay was from three to five years the rate was reduced to 17 per cent. Medical treatment, said Dr. East, might be more successful if tribunals had authority to enforce compulsory detention on criminal alcoholics and drug addicts for considerable periods early in their careers. But even then success would be uncertain, and detention in an ordinary prison was not always the most suitable remedy.

Criminal Justice Bill

In conclusion Dr. East drew attention to some of the provisions of the Criminal Justice Bill now before Parliament. If the provisions of Clause 34 were embodied in the Act he thought it might be expected that some of the more criminally minded alcoholics would be detained under its sanctions, with advantage to themselves and to the public. Clause 38 also, in cases of inebriety or drug addiction, should promote an early diagnosis of the underlying pathological condition and encourage suggestions for treatment where magistrates were unwilling to remand the offender to prison for an opinion on these matters. Again, if Clause 19 was accepted, some cases of inebriety and drug addiction would come under treatment at an earlier stage.

He mentioned also the cases of women who were repeatedly sentenced to short terms of imprisonment for drunkenness and made up the stage army of inebriates in the women's prisons. In 1936 at Holloway, of more than 1,000 women convicted of drunkenness, 55 per cent. were between the ages of 30 and 50, and 40 per cent. were over 50. He rejoiced in the statement of the Home Secretary in the House of Commons in March last favouring some institution—not the new prison—specially adapted to the needs of the habitual inebriates, the old women who came in week after week at Holloway. Finally Dr. East reminded his audience that constant study and vigilance were necessary if the problem of the alcoholic, the drug addict, and the criminal was to remain restricted as at present, and that medicine had much to contribute towards its solution.

EFFECT OF PELVIC VARIATIONS ON LABOUR

At a meeting of the Devon and Exeter Medico-Chirurgical Society on May 25 Dr. MARSHALL SCOTT read a paper on the influence of pelvic variation on the course of labour.

Dr. Marshall Scott said that in 1701 Hendrik van Deventer demonstrated the flat and generally contracted pelvis, while Smellie was the first to practise internal rotation for occipito-posterior presentations. The modern study of pelvic deformity began, however, with the classification of Michaelis and Litzmann in 1851. Internal pelvimetry by mechanical methods having proved disappointing, the classification of pelvic deformity passed into the background, following Barbour's dictum that the foetal head was the best pelvimeter; but it was found that minor abnormalities of the pelvis were often responsible for unexpected difficulty during labour. Manual internal pelvimetry was giving place now to radiological pelvimetry. *X*-ray examinations had shown that it was as rare for a woman to possess a perfect pelvis as a perfect face. These advances had culminated in Caldwell and Molloy's classification of pelvic deformity on morphological lines.

Four Types of Pelvis

Certain common shapes of the pelvis had a very definite effect on the behaviour of the foetal head during labour. The four main types of pelvis were:

The *anthropoid* type, resembling the long narrow oval pelvis of the anthropoid ape.

The *gynaecoid* type, showing all the well-known architectural characteristics of the normal female pelvis.

The *platypelloid* type, with the wide or transverse oval appearance.

The *android* type, which bore a morphological resemblance to the human male pelvis. The inlet was wedge-shaped or blunt heart-shaped.

Below the inlet the cavity of the pelvis might be affected by variation in the angle of the side walls and the curvature and inclination of the sacrum and symphysis pubis. A decrease in transverse capacity might be caused by convergence of the side walls, or variation of the length of the ischial spines. The subpubic arch might vary in its angle, and a narrow angle did not of necessity mean that the whole outlet was narrowed. The capacity of the posterior pelvis depended largely upon the position, shape, and inclination or curvature of the sacrum. Although a great deal of information might be obtained by ordinary clinical examination, these variations could actually be seen by stereoscopic radiography. The relative frequency of occurrence of the four main pelvic types was as follows:

	White American Woman	Author's Twenty Cases
Anthropoid	23.5 per cent.	4
Gynaecoid	41.4 „ „	10
Platypelloid	2.6 „ „	0
Android	32.5 „ „	6

Influence on Labour

Forceps delivery and Caesarean section were often necessary in women with the android formation, while with the gynaecoid pelvis spontaneous delivery was the rule. It was interesting to note that these two types might have exactly the same maximum transverse and antero-posterior diameters at the brim. The foetal head usually entered the pelvic brim in the transverse diameter. In the android type the narrow fore-pelvis and the flattening in the posterior part of the pelvis hindered internal rotation, and transverse arrest and occipito-posterior arrest were common. It was usually easier to free the head from the back of the pelvis in the transverse position, draw it down, and then rotate the occiput to the front under the subpubic arch.

In the anthropoid type mid-pelvic arrest in the transverse position might occur, but there was plenty of room anteriorly, and rotation was usually easy at the level of arrest. Should the occiput engage posteriorly and arrest follow, rotation would be very difficult unless the head was either pushed well up above the brim or pulled right down to the outlet. It might be wise in such a case to deliver as an occipito-posterior presentation. This little manœuvre of moving the head upwards or downwards before rotation would often facilitate internal rotation to a surprising extent, and should always be attempted instead of the commonly adopted practice of "pulling hard," which was to be so heartily condemned.

With regard to ante-natal care, routine *x*-ray examination of the pelvis was advocated in all primigravidae. In breech presentations version should be performed at about the thirty-fourth week. If this attempted version failed, the choice lay between delivery as a breech at term or after the induction of labour and Caesarean section. In vertex presentations, if the head was not engaged at the thirty-sixth week, and efforts to make it engage failed, an *x*-ray examination of the pelvis was imperative. If a minor degree of disproportion only was present a trial of labour should be given. It should not be allowed to continue long after rupture of the membranes, and should not degenerate into a passive contemplation of obstructed labour.

The July issue of the *Archives de Médecine des Enfants* contains an illustrated article by Dr. E. Wieland of Basle on the development of paediatrics in Switzerland containing portraits of eminent Swiss paediatrists of the last sixty years.

Local News

ENGLAND AND WALES

Birmingham United Hospital

The annual report for 1938 of the Birmingham United Hospital includes an account of the three principal institutions—the General, the Queen's, and the new Queen Elizabeth Hospital at the Hospitals Centre at Edgbaston. The last was named by Her Majesty as recently as March of this year, during the royal visit. The east and west blocks of the new hospital have been named respectively the Vincent Medical Block and the Cadbury Surgical Block, in honour of Sir Harry Vincent and Cadbury Brothers, who have been great benefactors. When the new hospital has expanded to 400 beds the position with regard to the Queen's Hospital in particular will be reviewed. It had been proposed to reduce the number of beds at the Queen's Hospital, the building of which, or the major portion of it, would be taken over by the Maternity Hospital; but the Maternity Hospital has now decided that it is not possible effectively to adapt the Queen's Hospital for its purpose, and intends to build a new hospital on the Hospitals Centre site. The position, involving as it does the maintenance of incomplete units, is not considered very satisfactory by the Board of Management of the United Hospital, but it is, of course, abiding by its undertakings. Reference is made in the report to the work of the medical committee, and the many problems with which it has been faced in connexion with the staffing of the Queen Elizabeth Hospital. In view of the many calls made upon the time of members of the staff it was with difficulty and not without sacrifice that satisfactory arrangements were eventually reached which provided the new unit with adequate medical, surgical, and specialist services without in any way impairing those rendered to the two older units. The first patients were admitted to the new hospital on the last day of 1938. At all three units the 96-hour fortnight for nursing staff is being introduced; it could not come into force at once, but all plans for the future are being based on the necessary reduction of working hours.

Pathological Research in Leeds University

Professors Matthew J. Stewart and J. W. McLeod report that in the years 1937 and 1938 the work of the department of pathology and bacteriology of the University of Leeds continued to increase steadily. A study in patients with renal calculi of the chemical blood changes indicated that these were not due to a primary hyperparathyroidism but were secondary to renal disease. Work is now proceeding on the development of calculi in the kidneys of recumbent patients. The surgical treatment of bronchiectasis by lobectomy and pneumonectomy has provided material for histological study incomparably finer than anything obtainable from the post-mortem room, where, as a rule, only the final stages of disruption are seen, often complicated by putrefactive changes. In surgical specimens the immediate fixation of fresh material is possible, and the pathological changes are available for study at much earlier stages. The results of this investigation are now being prepared for publication. A study is well advanced of the morbid anatomy and histology of chronic arthritis, special attention having been given to the sequence of tissue changes in bone and cartilage in the degenerative type of osteo-arthritis. The similarity of the morbid anatomy in swine arthritis to that in human beings has been established; the organism concerned in the former appears to be *Erysipelothrix rhusiopathiae*. The disease has been reproduced in swine by inoculations with cultures of this organism. Immunological studies have been made in man regarding the aetiological significance of various organisms, including *Streptococcus*

haemolyticus, Br. abortus, the pneumococcus, and *B. welchii.* The treatment of arthritis with gold salts has been continued at the Leeds Public Dispensary and Hospital; this clinic was established in 1934, and 1,300 cases have now been treated with gold. Observations on the morbid histology of diphtheria have demonstrated the greater power of penetration of the *gravis* and *intermedius* types as compared with the *mitis* type. The chief evidences of this greater penetrating power consist in morbid changes in the tissues deep to the superficial lesions, a notable example of this being haemorrhagic necrosis of the tonsil; the presence of degenerative lesions remote from the primary focus, especially fibrinoid necroses in the Malpighian bodies of the spleen; and the actual presence of diphtheria bacilli in the more remote parts of the lungs. By contrast the *mitis* infections produce lesions with a marked tendency to superficial spread, the membrane formed often penetrating to the trachea and even to the bronchi, not infrequently leading to laryngeal obstruction. Investigation has also been continued into the opsonic action of certain chemical substances on staphylococci, and particularly the possibility of reversing these effects by treatment with certain salts; it has been shown that globin, a basic protein and a constituent of haemoglobin, can act as an artificial opsonin. This work is being extended. Another field of research has been the interpretation of oxidation-reduction potentials in bacterial cultures, studies being directed particularly to the effect of the concentration and autolysis of pneumococcal cultures which have been shown to render the recorded potentials markedly more negative; the effect of the gaseous atmosphere on this phenomenon is now being investigated. It is stated in the departmental report that when the new pay-bed block is opened at the Infirmary the department will be responsible for the provision of the pathological and bacteriological services, to be paid for either on an agreed scale or on a *per capita* basis; in either case a considerable income will accrue, the disposal of which will be in the hands of the University of Leeds. Some of this income might be available to finance a senior appointment in haematology and clinical pathology similar to appointments already existing in many schools—for example, at the British Postgraduate Medical School in London, where much original work in haematology has been and is being carried on. As usual, Professor Passy contributes to the report a note on the work of the department of experimental pathology and cancer research. He mentions that Dr. Stickland has failed completely to substantiate Mendel's claim that potassium ferricyanide has a selective inhibitory action on the aerobic glycolysis of tumour tissue. A long-term inquiry is being pressed into the incidence of cancer in the relatives of patients who have suffered from malignant disease of the breast.

FRANCE

New French Health Passport

At the end of May of this year M. Rucart, the French Minister for Public Health, issued a circular giving detailed information about the health cards, booklets, or passports which are henceforth to be available for every French citizen from birth onwards. The passport is issued free of cost, and its acceptance is voluntary. In it are to be recorded the most important events concerning the owner's health from infancy to old age. The first part deals with his medical history and that of his parents, and the second part records his dental history. Care has been taken to maintain the confidential character of the information contained in the passport: it is not identified by the owner's name but by a number, which would enable it to be replaced if it was lost. An employer may not insist on scrutinizing an employee's passport. The authorities are urged by M. Rucart to persuade schools and hospitals to facilitate the distribution of these passports, which, in his opinion, have become necessary with the disappearance of the family doctor and the appearance in his place of specialists, who will find in the passport some of the information the family doctor would have been able to give in earlier days. The passport will provide information on hereditary predispositions, operations, past illnesses, vaccinations, accidents, physical measurements at different ages, and other items likely to help the doctor who is a stranger to his patient to form a fairly complete picture of him in a clinical sense. It is hoped that this passport will facilitate the medical examination and assessment of the physical fitness of recruits for the fighting services. M. Rucart states that he has consulted the chief French medical authorities and has found them unanimous in recommending a system of this kind. But, however acceptable the health passport may be in principle, various adjustments may have to be made in the details of this scheme before it can be considered as stabilized.

Awards and Scholarships

The French Academy of Medicine has awarded the "Grand Prix Prince Albert Ier de Monaco" to Jules Lefèvre for his work in biology over half a century. In connexion with the jubilee of the Pasteur Institute its scientific and executive committees have awarded Dr. H. Plotz of New York and Professor A. Saenz of Montevideo the Pasteur medal in gold in recognition of their contributions to science. Professor Saenz joined the Pasteur Institute in 1928 as a pupil of Calmette, and most of his recent research has been concerned with tuberculosis. The Roux Foundation, whose aim is to help in the recruiting of research workers for the Pasteur Institute, provides whole-time scholarships of 18,000 to 24,000 francs a year for young Frenchmen who have completed their scientific studies. For the year 1939–40 there are ten such scholarships available for young doctors, veterinary surgeons, chemists, physicists, and others interested in the biological sciences.

Professor Roffo Recipient of the Amerongen Prize

At the annual meeting of the Ligue Française contre le Cancer, held in the precincts of the Paris Faculty of Medicine, and in the presence of the Argentine Ambassador, the Amerongen Prize of 100,000 francs was awarded to Professor Angel H. Roffo, who for many years has been in charge of the Cancer Institute of Buenos Aires. In a survey of Professor Roffo's work Professor Hartmann devoted special attention to the last three years, during which Professor Roffo employed thousands of rats in his investigations into the part played by diet in the genesis of cancer. While one large group of rats was given food to which irradiated cholesterol had been added, another large group was given the same food without this addition. A considerable proportion of the cholesterol-treated group developed cancer of the stomach, while none of the controls did so. Having repeated this experiment frequently Professor Roffo came to the conclusion that there exist certain cancer-provoking foods. He has set aside the money value of the prize for the exchange of French and Argentine doctors, and he has undertaken to lodge the French doctor in his institute. The Amerongen Prize came into being after the donor had been a prisoner of war in a German camp and had seen several of his companions in captivity die of cancer.

Anti-rabies Services in French Colonies

The French Colonial Health Service has issued a memorandum on the desirability of decentralizing the anti-rabies services in the French Colonies. At present more than 6,000 cases of rabies, actual or suspected, are treated annually in the French Colonies; in French Indo-China alone there were 5,333 cases in 1937, 350 of which were in Europeans. Until 1937 the only French Colonial anti-rabies centres were those of the Pasteur Institutes of Dakar and Brazzaville, with three secondary centres for West and Equatorial Africa, the Pasteur Institute of Antananarivo

for Madagascar, the Pasteur Institutes of Saigon and Hanoi, as well as the bacteriological laboratories of Pnom-Penh, Hué, and Vientiane for Indo-China. Although air ambulance services and improved facilities for travel by other means have made it easier for patients to attend a central anti-rabies service, it is felt that decentralization is both desirable and feasible, and to this end Dr. Remlinger, director of the Pasteur Institute of Tangier, has issued a *Guide Pratique*, perusal of which is recommended to outpost doctors who may be called upon to treat cases of this disease.

Correspondence

Treatment of Bone Cavities and Raw Areas

SIR,—I have noted with interest in all the valuable articles which you have been publishing on war and air raid casualties for some months past, including those of Mr. St. John Buxton on the lower limb (June 17, p. 1241); Mr. Claude Frankau on joint wounds (July 1, p. 27); and Mr. Max Page on amputations (July 8, p. 77), that the recommendation is made to treat bone cavities, or other raw areas, which it is impossible to cover with skin, by a dressing of some form of paraffin gauze (or petroleum jelly) with or without flavine. This was the technique in which I was trained during the last war and which I employed for some years after it; but I found almost constantly that the new granulation tissue, even in the best healing wounds, tended to work its way amongst the meshes of the gauze, like a creeper up a trellis, and though most of the gauze came away easily after a few weeks, small fragments remained entangled for months and appeared to delay healing. Now for some years past I have been packing such wounds, whether the result of trauma or of spontaneous osteomyelitis, with a layer or wedge of "stent" (dental wax) over which are applied gauze and wool, the final firm compression being usually supplied by plaster-of-Paris to the whole limb. The stent splints the healing tissue locally, and with elimination of muscle-pull by extensive plaster-of-Paris splinting the rate of healing of deep cavities and large areas is astonishingly hastened, an observation unanimously confirmed by the nursing staff at every institution where the method has been introduced. Although stent was used in the last war by the plastic surgeons, and for chronic bone cavities, it seems at present little used for acute cases, in which it is equally valuable; and therefore I trust you will allow me this opportunity of making it more widely known.—I am, etc.,

M. FORRESTER-BROWN,
M.S., M.D.Lond.

Bath, July 11.

Prevention and Treatment of Shock

SIR,—My only excuse for troubling you further on this subject is that, as an anaesthetist, I am jealous of the good repute of spinal anaesthesia, and anxious that its abuse should not result in an unnecessary loss of human life. Mr. N. L. M. Reader's latest letter (*Journal*, July 8, p. 88) merely serves to confirm my previously expressed criticism that his advocacy of spinal anaesthesia for the treatment of shock is dangerous advice to the timid, and displays an equally dangerous lack of knowledge of the physiological principles involved. One issue has been cleared by Mr. Reader's admission that a fall of blood pressure does occur in high spinal anaesthesia, but his claim that his ephedrine–spinocain technique is normally exempt from an effect which is common to all the generally used drugs is contrary to the clinical observation of the majority of anaesthetists, most of whom, because of its obvious uncontrollability, have long ago abandoned the use of spinocain. As a matter of interest I looked up some ten-year-old blood-pressure records of fifty consecutive patients whom I had anaesthetized by Mr. Reader's technique. There was a fall of blood pressure in thirty-five cases (severe in three); a rise of blood pressure in eleven cases; and no appreciable change in four cases.

Returning to the main issue, which is Mr. Reader's statement that spinal anaesthesia is the correct treatment of shock, I maintain that to quote, as he does, the so-called neurogenic factor in the production of shock without giving any explanation of how this factor exerts its deleterious effect is merely begging the question. From the point of view of anaesthesia the two essential bugbears of shock—namely, a pronounced fall in the circulating blood volume and a fall of blood pressure—still remain constant clinical factors whatever theory or origin is postulated. In a shocked patient all the compensator mechanism which tends to maintain an efficient circulation is already in action. In an unshocked patient this same mechanism allows Mr. Reader to give a low spinal anaesthetic—that is, an upper limit of anaesthesia not higher than the twelfth dorsal root—using spinocain or any other drug without producing a fall of blood pressure. Yet the essential fact remains that in a shocked patient the effect of spinal anaesthesia is to put out of action the protective compensator mechanism which is so essential to the maintenance of an effective circulation.

That dangerous and even fatal results follow the administration of spinal anaesthesia to shocked patients unless they have previously received energetic anti-shock treatment (warmth, rest, sedatives, ephedrine, and restoration of circulating blood volume) is an established clinical fact based upon the observation not of one but of many experienced anaesthetists. To swallow the pill proffered by Mr. Reader would have the serious effect of resulting in an unnecessary loss of human lives. Incidentally, it would also quite probably result in bringing spinal anaesthesia into the relative disrepute in which it languished for nearly a decade following the last war. This disrepute was, I am told, largely due to the war-time use of spinal anaesthesia in exactly the type of case in which Mr. Reader now so passionately advocates its administration.

Dr. C. Langton Hewer (July 8, p. 91) rightly draws attention to the fact that the same principles should govern the administration of anaesthetics during war or peace. The spate of correspondence on the whole subject has been extremely interesting. The danger is that much of it has been plausible theorization on methods which, like the administration of spinal anaesthetics to shocked patients, have in clinical practice already been tried and found wanting.—I am, etc.,

H. K. ASHWORTH.

Manchester, July 14.

Dental Sepsis and Rheumatism

SIR,—When one considers that for a quarter of a century infection from a primary focus has been the prevailing conception in chronic rheumatism, it is rather surprising to find that the article of Drs. J. M. Vaizey and A. E. Clark-Kennedy (*Journal*, June 24, p. 1269) has caused so little commotion. The reason probably lies in the fact that most medical men have discovered from their own personal experience that the doctrine of focal sepsis,

as commonly held, does not explain everything rheumatic, and that the results of its application (with occasional exceptions) are singularly barren.

Mr. F. St. J. Steadman, in his criticism of the article (July 8, p. 90), doubtless thinks he is defending the focal theory; he is not defending it, but rather offering an extension of it which is, in my view, exceedingly valuable. He compares the primary focus to a fire which starts in the kitchen and spreads to the parlour, pointing out the uselessness, so far as the safety of the house is concerned, of extinguishing the fire in the first room and leaving it to burn elsewhere—an admirable picture of the sort of thing that is happening, but not the picture which the doctrine of focal sepsis presents. Surely that doctrine is concerned only with the first conflagration, the extinction of which should make the whole house safe. Experience proves that it does not.

I have suggested (*Journal*, February 15, 1936, and elsewhere) that some sort of extension or amplification of the focal theory is necessary before it can be of constant value in the treatment of chronic rheumatism. I adduced evidence to show that in fibrositis, for instance, the nodule represents a secondary focus of infection which eventually becomes independent of the primary focus and no longer requires its influence for its own continued existence and spread. If this view is correct it would be almost as unreasonable to expect to cure syphilis by the excision of the primary sore as to cure rheumatism by extracting teeth. It would follow that that treatment will be most generally successful which, while not neglecting the primary focus, is chiefly interested in attacking the secondary focus or foci, which can be done expeditiously by the local injection of lipovaccines, and still more simply by injections of oily salicylates and other oil-soluble chemicals.—I am, etc.,

London, W.1, July 14. G. LAUGHTON SCOTT.

"Medical Testament" on Nutrition

SIR,—It is good to see the evidence of sustained interest in the "Medical Testament" published by the Cheshire Panel Committee, revealed in the three letters of Mrs. Violet G. Plimmer, Dr. P. A. Galpin, and Messrs. Remington Wilson and James Gibson in the *Journal* of July 15 (pp. 140, 141, and 142).

Through the courtesy of the able secretary of the movement, Dr. Lionel Picton, I had the privilege of reading the Testament prior to the public launching of the movement, and I was profoundly impressed by its very great value; and if it had been possible for me to accept the invitation to be present at its inauguration I would have taken the opportunity to emphasize a great truth in Dr. Galpin's letter, that "the Testament is a challenge to all medical practitioners." But it is much more than that. It is also, in an important sense, a challenge to an increasing army of medical research workers in these days, and to the unduly narrow, restricted, and over-specialized outlook underlying so much research work. The special feature of the Testament which attracted me was the evidence it revealed of the spirit of true scientific research in the rank and file of that section of the profession in whose hands lie so great opportunities through accurate "clinical" research of profoundly influencing medical teaching and advance.

The query raised by Messrs. Remington Wilson and James Gibson is an interesting and important one, and its solution will necessitate an attack from the laboratory side. From my experience of the problem of nutrition of the land in relation to human nutrition I incline to the view that the legitimate fear they have visualized will prove to be unfounded.

It is much to be hoped that the clarion call from the Cheshire practitioners will continue to receive the full measure of attention which its importance demands.—I am, etc.,

Drem, N.B., July 16. CHALMERS WATSON.

"Meta Fuel" Poisoning

SIR,—Drs. Lewis, Madel, and Drury are to be thanked for again calling attention in the *Journal* of June 24 (p. 1283) to the dangers of child poisoning with "meta fuel." In my opinion it is most reprehensible that no steps have been taken by the State to insist upon this product being marketed as a poison during the twelve years since the first British case was recorded (Willcox and Mitchell, 1927). I ask that the British Medical Association take immediate steps to bring this matter to the attention of the appropriate Government authority with a request for suitable action.—I am, etc.,

Greenford, Middlesex, July 14. ALISTAIR FRENCH.

Bee-sting Anaphylaxis?

SIR,—Your issue of June 24 has just arrived at this distant port. In it there is a letter from "Apiarist" (p. 1306) which describes the interesting consequences of a bee sting (or two or three). I am writing to suggest that "Apiarist" submit himself to a series of skin tests for allergy to the pollens of those flowers from which his bees customarily collect their honey.—I am, etc.,

J. ROSSLYN EARP, Dr.P.H.,
Medical Editor.

Department of Health, Albany, State of New York, July 5.

Insulin Syringes

SIR,—In the *Journal* of October 3, 1925 (p. 632), I wrote to recommend a modification of the Record syringe, which I devised in order to ensure automatic control of the dose of insulin, and to avoid those errors which are likely to arise as the result of the human element mentioned by Dr. S. Levy Simpson (July 15, p. 142). The piston shaft was threaded and fitted with two nuts, which could be locked together by the physician at any desired position. When the parts of the syringe are fitted together it is impossible to draw back the plunger beyond a certain fixed point, and this amount of air can conveniently be injected into the phial before extracting the exact dose of insulin. The syringe, fitted in a spirit-proof cylindrical case, has been frequently made for me at a small cost by Messrs. Allen and Hanburys, and has proved invaluable for patients whose eyesight, as is often the case in spite of insulin, becomes defective. The method would also prove suitable for those who are not trained in the use of scientific instruments, and on whom one cannot safely depend.—I am, etc.,

Blackpool, July 15. F. M. HILLIARD, M.D., M.R.C.P.I.

Sudden Blindness

SIR,—I have read with much interest the article by Mr. Joseph Minton in your issue of July 8 (p. 61) on vascular disease studied in the retina. To the three phases he mentions I would suggest the addition of a fourth, or more accurately a preliminary, as this phase has its place before the first mentioned by Mr. Minton. In this condition there are no specific ocular symptoms, and I

have usually discovered these cases in a routine examination of the fundus. The predominating, and indeed as a rule the only, ophthalmoscopic appearance present suggestive of vascular disease consists of the diversion and/or obliteration of the veins at arteriovenous crossings. The arteries may show the "copper-wire" appearance so commonly seen, but the point I would stress is the complete lack of any irregularity in arterial calibre. I believe that we are here dealing with that group of cases described by Allbutt under the heading "hyperpiesia," in which condition the blood pressure is invariably raised, but there are no definite signs, cardiac or renal, or arterial apart from the fundus changes I have mentioned. The lesion has generally been held to be somewhere in the capillary network, or to be that referred to by Evans as "diffuse hyperplastic sclerosis," probably first becoming manifest in the arterioles of the kidney and spleen. Here, I maintain, is a well-defined group of cases which is not given the attention it merits in textbooks dealing with the subject.

In reference to a further point raised by Mr. Minton, I saw an unusual case recently bearing obvious resemblances to the one mentioned by him. It was of a married woman aged 34, who three weeks previously had had an early miscarriage, losing a good deal of blood before professional aid could reach her. She fainted during this time, and when she recovered she found there was "something wrong with the sight." She eventually found this to be a loss of the lower part of her left visual field. When I saw her the upper nasal and temporal retinal arteries were the merest threads, and while the upper half of the disk was absolutely pale, the lower half was of normal appearance, the line of demarcation standing out with singular clarity. The lower nasal and temporal arteries were normally filled with blood. Perimetry showed complete loss of the lower half of the visual field, its lower edge being a horizontal line. The blind spot was, of course, continuous with the lost part of the field, but the macula had escaped, and full central vision was preserved. In this case it is assumed that an embolus from the pelvic veins passed through a patent foramen ovale and eventually became lodged in the upper division of the arteria centralis retinae before this had divided into its temporal and nasal branches.—I am, etc.,

Eastbourne, July 12. A. LUCAS YOUNG.

Haemophilia in Absence of Family History

SIR,—In view of the absence of family history your readers may be interested in the following case of haemophilia which came to my notice in the out-patient department of the Hospital for Sick Children, Great Ormond Street, W.C.

A boy aged 8 was taken to Great Ormond Street for the first time at the age of 3 with a haematoma of the left arm. On investigation the coagulation time was found to be 8 mins. 50 secs. and the bleeding time 3 mins. 45 secs., with a moderate clot. The boy was seen subsequently at intervals between 1933 and 1939 with a bruised forehead, haematomata of the knee and ankle, a swollen hand presenting the appearance of cellulitis, and bleeding from a loose tooth. When I last saw him in June of this year he had a large haematoma of the left knee. The circumference of the knee was 13¼ inches.

The boy has a sister aged 13 and a brother aged 2 who bruise easily. Another brother died at the age of 15 as the result of haemophilia. His two maternal uncles, aged respectively 41 and 33, show no trace of the disease. One of these men has a son who is also perfectly healthy. The maternal grandmother had three sisters. One married and had a son who has never shown any signs of haemophilia, and the history on the father's side is equally negative.

It would be interesting to know whether any other reader has come across a similar case and whether any reasonable explanation can be offered.—I am, etc.,

A. GENEVIEVE REWCASTLE, M.B., B.Ch.

Kew Gardens, Surrey, July 7.

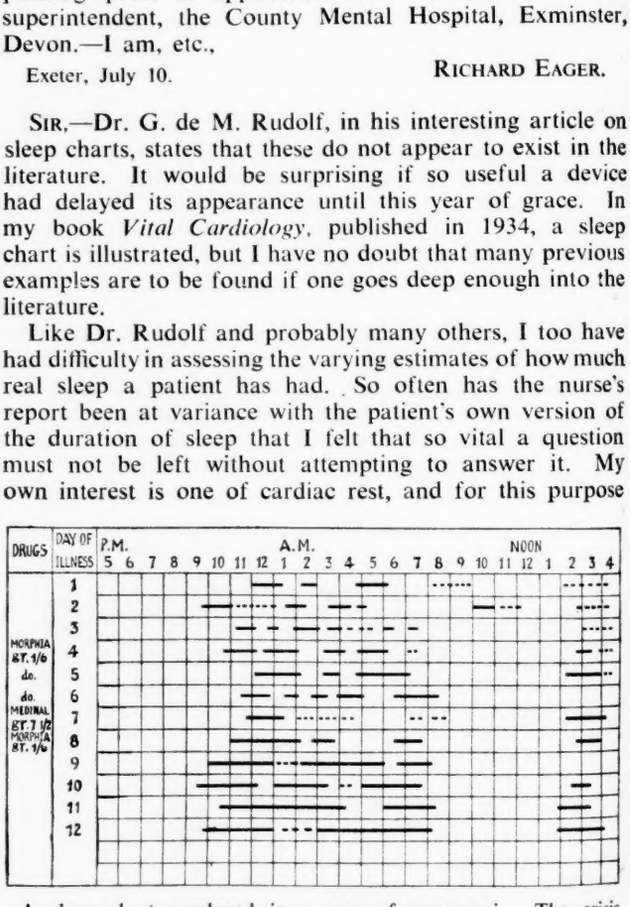
Sleep Charts

SIR,—With reference to the article by Dr. G. de M. Rudolf on sleep charts in the *Journal* of July 8 (p. 76) I wish to point out that the statement that "such charts do not appear to exist" is incorrect. Dr. Steen, when medical superintendent of the City of London Mental Hospital, introduced such a chart, and this was embodied into the "night and morning temperature chart" at the Devon Mental Hospital, Exminster, about sixteen years ago. It has been used in all cases admitted to that hospital since then, and a copy can be obtained from the hospital printing press if application is made to the medical superintendent, the County Mental Hospital, Exminster, Devon.—I am, etc.,

Exeter, July 10. RICHARD EAGER.

SIR,—Dr. G. de M. Rudolf, in his interesting article on sleep charts, states that these do not appear to exist in the literature. It would be surprising if so useful a device had delayed its appearance until this year of grace. In my book *Vital Cardiology*, published in 1934, a sleep chart is illustrated, but I have no doubt that many previous examples are to be found if one goes deep enough into the literature.

Like Dr. Rudolf and probably many others, I too have had difficulty in assessing the varying estimates of how much real sleep a patient has had. So often has the nurse's report been at variance with the patient's own version of the duration of sleep that I felt that so vital a question must not be left without attempting to answer it. My own interest is one of cardiac rest, and for this purpose



A sleep chart employed in a case of pneumonia. The crisis occurred on the eighth day. The periods of sound sleep are shown by the continuous lines, and restless dozing by an interrupted line.

I have employed sleep charts for some ten years. I enclose an example of one employed in pneumonia. This is not dissimilar to Dr. Rudolf's save in the symbols used.

The value of the sleep chart is beyond dispute, for it provides a continuous record throughout the twenty-four hours for all concerned to see in black and white. Moreover it quicken's the nurse's interest in the subject, exposes the weakness of the various sedative drugs, and above all clearly shows how the patient is faring. My own use of the chart has been confined to serious cases which require day and night nursing, observation being more or less constant.

I hope Dr. Rudolf's communication will lead to a wider use of this extremely useful device, which can be home-made in a few minutes.—I am, etc.,

BRUCE WILLIAMSON, M.D., F.R.C.P.

London, W.1, July 11.

The Cause of Sleep

SIR,—In Dr. W. Russell Brain's interesting paper on sleep in the *Journal* of July 8 (p. 51) the following statement is made: "The extension of inhibition to the waking (hypothalamic) centre might produce sleep without sleep necessarily being identical with an extension of inhibition over the whole cortex."

Leaving the word "whole" out of discussion, the work of Pavlov does indicate that normal sleep depends upon the general spread of a process of inhibition over the cortex, and this inhibition apparently descends to subcortical levels, including that of the hypothalamic waking centre. To suggest that there might be inhibition of this waking centre without a corresponding dominance of inhibition in the cortex is to imply that the cortex could be "awake," as during the excitation of consciousness, while the rest of the body was "asleep." In view of the fact that in normal conditions the cortex always dominates in the main the lower nervous levels, this suggestion is not tenable for normal individuals. The lower nervous levels cannot normally act in discordant opposition to cortical function, according to the overwhelming weight of evidence of neurology and comparative anatomy.

Kleitman's contribution has been to show that a "functional break" in the reception of stimuli by the cortex is involved in the phenomenon of sleep. In Pavlov's dogs this functional break was an effect of sleep, induced as internal inhibition by a monotonous stimulus, under conditions which minimized other exteroceptive stimuli. Kleitman has shown that this functional break, in the form of a relative cessation of exteroceptive and proprioceptive stimuli, can be a cause of sleep as well as an effect. Even in Pavlov's dogs Kleitman's factor was present as a cause as well as an effect, since the dogs were immobilized, with the exclusion of most ordinary stimuli from the room.

It is common knowledge that muscular relaxation in quiet and still surroundings is conducive to sleep. And in such surroundings monotonous stimuli such as a ticking clock (indoors) or running water or rustling leaves (outdoors) are frequent accompaniments of a relative cessation of exteroceptive and proprioceptive stimuli. It may be observed everywhere that a relative cessation of stimuli as a cause of sleep frequently acts in conjunction with monotonous or familiar stimuli of low intensity. In physiological terms internal inhibition induced by such stimuli is assisted in its spread by a diminution of excitation-provoking stimuli, this diminution being itself a cause of sleep.—I am, etc.,

R. L. WORRALL.

Brighton, July 9.

The Abortion Report

SIR,—Although Professor Raymond Pearl is a weighty authority, his view as to what "appears" to be indicated by American statistics is only an opinion. The statistics themselves are facts, and are open to other explanations. To test this, can the Family Planning Association give figures for the incidence of abortion in France—a country which seems highly efficient in the practice of birth control?

Mrs. Margaret Pyke does not answer my point as to lack of need for instruction in contraception; our present birth rate suggests a fair degree of knowledge already exists. Experience in V.D. centres indicates that there *is* a "danger of serious repercussions" from further dissemination of contraceptive knowledge. General discussion of contraception is not possible within the limits of a letter, but I would be happy to undertake such a discussion with Mrs. Pyke in a suitable forum. My letter was intended to question the accuracy of the statement that dissemination of contraceptive knowledge is an obvious remedy for the prevalence of induced abortion.—I am, etc.,

R. C. WEBSTER.

Darwen, Lancs, July 9.

Medicaments and Dressings: Control of Prices

SIR,—Some steps are being taken to prevent excessive profiteering on the part of those who supply the means of defence and counter-destruction in preparation for the much-expected war. This laudable principle has recently been extended to include such vital articles of maintenance as food and drink. It would be of interest to our profession (and no less to the public in general) to know that similar efforts are being made to safeguard them both effectively against exploitation in respect of medicaments and dressings of recognized value and wide application, such as might easily arise during hostilities on a large scale. Whatever may have been the explanation for the abnormal rise in prices during the last war, there should be no excuse now for a repetition of such profiteering. So who is going to do something about it?—I am, etc.,

GEORGE DE SWIET.

London, W.10, July 8.

The Services

DEATHS IN THE SERVICES

Surgeon Captain EDWARD CHARLES SAWDY, R.N. (ret.), died at Bournemouth on June 22. He was educated at St. Mary's Hospital and took the M.R.C.S., L.R.C.P. in 1898, after which he entered the Royal Navy. He attained the rank of surgeon commander on November 3, 1912, and retired, with an honorary step in rank, as surgeon captain on December 30, 1926. He served in the war of 1914–18, receiving the medals.

Colonel ALFRED WILLIAM BEWLEY, C.M.G., late A.M.S., died at Alverstoke on June 18, aged 73. He was born at Stillorgan, Rathdown, Dublin, on February 21, 1866, was educated at the Royal College of Surgeons in Ireland, and took the L.R.C.P. and S.I. in 1887. After filling the post of resident medical officer at the National Children's Hospital in Dublin he entered the Army as surgeon on February 1, 1890, became lieutenant-colonel on May 15, 1912, colonel in the long war promotion list of March 1, 1915, and retired on September 1, 1919. He served in the Chitral campaign on the North-West Frontier of India in 1895, with the relief force, receiving the frontier medal with a clasp, and in the war of 1914–18 as an A.D.M.S. in France and Flanders, when he was mentioned in dispatches in the *London Gazette* of February 17, 1915, January 1, 1917, and May 29, 1917. He received the C.M.G. in 1917.

Lieutenant-Colonel GEORGE BEDINGFIELD HOLROYDE, M.C., R.A.M.C., died in the Military Hospital, Cairo, after an operation, on July 2, aged 53. He was born on January 2, 1886, the son of Dr. John Holroyde of Chatham, and was educated at the London Hospital and took the L.M.S.S.A. in 1914. He entered the Royal Army Medical Corps as temporary lieutenant on September 10, 1914, became temporary captain after a year's service, and took a permanent commission as captain on November 1, 1919, being ranked as captain from March 10, 1918. He attained the rank of major on March 10, 1926, and became lieutenant-colonel on October 13, 1937. He served throughout the war of 1914–18, was mentioned in dispatches in the *London Gazette* of July 21, 1917, and received the Military Cross.

Medical Notes in Parliament

The recommendations of the Interdepartmental Committee on Abortion were among the subjects set down for discussion in the House of Lords this week.

The Conservative Health and Housing Committee met at the House of Commons on July 12 to consider action in reference to the Medicine Stamp Duties. When announcing his decision on June 22 to postpone the report for twelve months, the Chancellor of the Exchequer had stated that it would be necessary to re-examine the problem as regards both taxation and public health aspects. The Committee therefore decided to ask the Chancellor and the Minister of Health jointly to receive a deputation which would submit suggestions for the revision of the Stamp Duties, and for legislation to secure control of proprietary remedies in the interests of public health. This deputation will probably consist of Sir Francis Fremantle, Sir Arnold Wilson, Captain G. S. Elliston, and Mr. Keeling.

Sir Francis Fremantle presided at a meeting on July 17 of the Parliamentary Medical Committee, which was addressed by Sir Drummond Shiels about educative work on sexual matters among adolescents as a factor in preventing venereal disease.

Supplementary Civil Estimates were issued on July 18. They include a vote for emergency hospital evacuation and other services in England and Wales, as under:

	1939 £
Medical stores and equipment for hospitals and first-aid posts	1,478,000
Supplementary hospital accommodation	4,200,000
Agreements with voluntary hospitals	300,000
Emergency nursing services	100,000
Grants to local authorities—adaptation of buildings as hospitals and protection of hospitals	1,350,000
Evacuation of Civil Population	
Grants to local authorities—preparation of plans	50,000
Grants to local authorities—measures to facilitate transference, accommodation, or maintenance of civil population	50,000
Acquisition and storage of equipment and other material	525,000
Other services	38,000
Total	8,091,000

The equivalent Estimates for Scotland are:

	1939 £
Medical stores and equipment for hospitals and first-aid posts	208,000
Supplementary hospital accommodation	1,500,000
Agreements with voluntary hospitals	102,000
Emergency nursing services	20,000
Grants to local authorities—adaptation of buildings as hospitals and protection of hospitals	188,000
Evacuation of Civil Population	
Grants to local authorities—preparation of plans	15,000
Grants to local authorities—measures to facilitate transference, accommodation, or maintenance of civil population	25,000
Acquisition and storage of equipment and other material	175,000
Other services	6,150
Total	2,239,150

The "Other Services" in these Estimates comprise:

(i) Expenses in respect of a bacteriological service for controlling the spread of infectious disease in the event of war, including purchase of apparatus, equipment, and material (Section 53 (1) of the Civil Defence Act, 1939).

(ii) Preparation and maintenance of emergency registers of doctors, dentists, pharmacists, and opticians, including the expenses of Central Emergency Committees.

(iii) Miscellaneous: including payments to officers of voluntary hospitals, etc., in connexion with plans for co-ordination in the event of war (Section 53 (1) of the Civil Defence Act, 1939), and compensation payments under Section 71 (2) of the Civil Defence Act, 1939.

Progress of Bills

The Royal Assent was given in the House of Lords on July 13 to the Adoption of Children (Regulation) Act; the Local Government (Amendment) (Scotland) Act; the Unemployment Insurance Act; the Civil Defence Act; the Marriage Act; the Marriage (Scotland) Act; the Marriages Validity Act; the Ministry of Supply Act; and the London Government Act.

In the House of Lords on July 17 the Finance Bill and the Milk Industry (No. 2) Bill were brought up from the Commons and read a first time. The following day the House-to-House Collections Bill, formerly the Charitable Collections Regulation Bill, was read the third time, and passed.

Milk Bill

When the House of Commons went into committee on the Milk Bill on July 12 Mr. TOM SMITH moved an amendment to Clause 1 (Payment to producers and boards in respect of quality milk) for the purpose of securing from the Minister of Agriculture an indication of what was meant by "accredited milk" and "standard milk." Sir REGINALD DORMAN-SMITH said the accredited milk producer to get his licence must satisfy the licensing authority as to the general health of the cow, his arrangements for producing milk, and the structure and cleanliness of the building and the cleanliness of the implements. For standard milk there were much the same conditions. The herds of accredited producers were subject also to periodical inspection and the milk was subject to tests. A high standard was set for cleanliness—the same standard as for tuberculin-tested milk. The Ministry and the Milk Board desired to get to a position where nothing below the standard of accredited milk would be sold for liquid consumption, but they had first to do this by encouragement.

Mr. WILLIAMS said periodical inspection took place on certain farms, and it might be that the general health of the herd was fairly good, yet it might equally be that every head within that herd would react to a tuberculin test. If all the herds reacted to that test, the premium under Clause 1 would still be paid. The attested herd was different from the accredited herd, and the accredited herd might react to the tuberculin test and get a premium. Cleanliness of buildings was, apparently, the condition for receiving this premium. Captain HEILGERS said it was not only a matter of buildings but of a rigorous inspection of all the cows four times a year. Any cow that was seriously affected with tuberculosis was bound to be seen by the inspector, and only the cows that were seriously infected were likely to give infected milk. Mr. Williams's amendment was negatived and the clause was ordered to stand part of the Bill. Other clauses were approved after discussion.

In a discussion on the schedule (Payments for quality milk) Dr. EDITH SUMMERSKILL said the most undesirable feature of the Bill was that the taxpayer was being asked to subsidize milk which was not clean, or pure, or safe. In the schedule the words "quality milk" occurred, and conveyed to the general public that the milk was safe and clean, whereas Parliament was asked to subsidize accredited and standard milk, which was a danger to the community. They should not give one penny to the producers of that kind of milk. Every year 2,000 children died as the result of infection from milk which was called accredited and standard milk, while three-quarters of the cases of St. Vitus's dance and three-fifths of the cases of infected bone in children were due to infected milk.

The schedule was approved and the committee stage concluded.

The report stage of the Bill was taken on July 14. Mr. TOM WILLIAMS moved to omit from the schedule of payments in respect of quality milk the item: "Milk from an attested herd which is not accredited, standard, tuberculin-tested, or certified milk." His view was that milk which failed to reach any of those standards must be of very low grade, in respect of which there should be no premium. Dr. HADEN GUEST said that, taking the country as a whole, a large number of

cattle were infected with tuberculosis. To make all the cattle free from disease was possible, and should be followed. He asked how quickly the system of payments was likely to free the cattle from disease.

Sir REGINALD DORMAN-SMITH said the premium which the House was discussing came under the category of disease eradication. It was not right to suggest that milk which did not come up to the accredited standard was dirty milk. It might be that buildings were not up to the accredited standard, but the milk might still be pure. Mr. A. V. ALEXANDER said the farmer might take care and eradicate tuberculosis from his herd yet still send milk to market which would be liable to produce infantile diarrhoea and diphtheria. Mr. Williams's amendment was negatived and the report stage ended.

Sir REGINALD DORMAN-SMITH then moved the third reading of the Bill. He said he could not give Dr. Haden Guest an estimate of when the country would have completely clean milk. The Milk Marketing Board was now ready to submit to him a cheap milk scheme broadly similar to the scheme in Scotland. The milk would be made available to local authorities in connexion with their maternity and child welfare arrangements at 2d. a pint, which was not more than half the ordinary price. Local authorities would be free to authorize a supply of milk free to the consumer, or for part payment or on full payment of the reduced charge of 2d. a pint. The balance of the cost of milk sold at less than 2d. a pint would fall on the local authorities' own funds. The main object was to increase consumption, and there would be no limit to the amount of the grant which could be made by the Treasury. Dr. HADEN GUEST said every doctor would become a propagandist in the "Drink more milk" campaign as soon as the medical profession was assured they could do that in safety. One thing that would make the profession 100 per cent. wholehearted in that direction would be for the Minister to introduce a short Bill to ensure that milk was pasteurized before it was issued for human consumption.

The Bill was read a third time.

Milk and Nutrition

The BISHOP OF WINCHESTER in the House of Lords on July 12 called attention to malnutrition and asked the Government if it proposed further steps to provide milk at a reduced price or free to expectant and nursing mothers, children below school age, and children at school. He said the figure of 92 per cent. for men admitted to the militia as fit was most satisfactory, but there was a startling contrast with the figures which had been published about applicants for entrance to the other Armed Forces. It was possible that the standard of physical fitness for entrance in the militia differed from that adopted in the past for the Army. He hoped the Minister who would reply would tell the House more about these figures. Inquiries had shown a considerable amount of malnutrition among the children of the country. There was no evidence of starvation, but malnutrition meant lower vitality, liability to illnesses, and loss of weight and of height. The causes of malnutrition were partly ignorance but, more largely, low wages. A direct way of dealing with malnutrition was to see that those unable to provide sufficient milk for their families should have this milk free or at a lower price through subsidies.

NATIONAL PROPAGANDA AND EDUCATION

Lord HANKEY said that as Secretary of the Committee of Imperial Defence he was humiliated by the fact that year after year more than 50 per cent. of men offering themselves for enlistment in the Army were rejected for physical and medical reasons. The late Sir Walter Morley Fletcher, then Secretary to the Medical Research Council, assured him that medical research had proved that the defects which caused these rejections were curable by proper nutrition, but Sir Walter warned him that it took fifteen years to translate research into action in such matters. The militia enlistment figures afforded ground for satisfaction, but in the militia no minimum was specified for height, weight, or chest measurement, and some of the men with minor defects of the feet and of vision who were placed in Grade 2 (*a*) would be rejected for the Regular Army, and the standard for the latter was lowered in 1936. The number of unfit people in all classes and of all ages was disturbing. This could be avoided by proper nutritional methods, but the people who wished to try these methods did not know how to begin. In schools next to nothing was taught about this question of nutrition, and what was taught was mostly out of date. The time had come for national propaganda and education. The textbooks were to hand in the reports of the League of Nations Mixed Commission and the Medical Research Council.

SHORT-SIGHTED OPPOSITION TO PASTEURIZATION

Lord ASTOR said he was chairman of an advisory committee to the Milk Board which supervised an experiment in the provision of a milk ration for children. The final report of this inquiry would probably be published this autumn; two interim reports had been published. Care had been taken in selecting a committee of medical and other experts to supervise the experiment, and four medical officers were also selected. Something like 8,000 children were under observation. In growth and weight children who received a ration of milk improved more than children who received no milk; children who had a double ration of milk improved more than children who received a single ration, and there was substantially no difference between children given raw milk and those given pasteurized milk. It was to the farmers' interest to get the backing of the medical profession for a "Drink more milk" campaign, but they would only get that backing if the milk supply was rendered safer. They were short-sighted if they opposed measures for pasteurization of milk which did not come from a tubercle-free herd. He hoped that when the education campaign began, for which Lord Hankey asked, there would be put before the public the findings in favour of pasteurization by the Milk Reorganization Committee, the Advisory Committee on Nutrition to the Ministry of Health, the Luke Committee, the Committee on Cattle Diseases of the Economic Advisory Council, and the Ministry of Health and Department of Health for Scotland. If the Ministry of Agriculture considered it necessary that a calf should have pasteurized milk if the milk could not be guaranteed tubercle-free, surely provision should be made to secure safe milk for the children.

Lord DAWSON OF PENN, referring to the militia statistics, said they had to remember that the militia came from the whole population, whereas those who went into the Army in the ordinary way contained a larger proportion who were down on their luck. If we wanted strong and healthy children food must be available for them which was adequate in quantity and quality, and, above all, there must be a sure supply of fundamental protective foods and of fresh foods such as milk, vegetables, eggs, etc. He supported the plea for the pasteurization of milk. The Bournemouth outbreak was evidence enough of the need for this. Diphtheria and scarlet fever had been proved over and over again to be due to milk. To build up healthy children we must have a persistent policy from the time the child was born to the age of 16.

Lord CORK AND ORRERY said he had watched experiments on training ships in giving young boys milk. Medical officers said that within a month the boys' resistance to minor ailments was much improved and their health was on the upgrade.

GOVERNMENT REPLY

Lord DE LA WARR, President of the Board of Education, said the figures they had for malnutrition tended to look as though the problem was on the increase, but he thought the reason for the difference in the figures was that standards tended to improve. The Government admitted that the supply of milk to mothers and to children under 5 was still inadequate and that the only way to increase the figures was by a substantial reduction in price. The Government was working with the milk industry to secure a reduction in the price of milk to local authorities for supply to mothers and to children under 5; this reduction would increase the consumption of milk for that purpose from 3 million gallons

a year to 20 million. The Milk Bill now before Parliament made financial provision for this. The scheme for giving children in the schools milk at half price had induced the consumption of 20 million gallons a year. The increase in the number of children receiving milk was now rather slower, but was definite and continuous. They were pressing local authorities on the provision of milk during holidays, and they had lately arranged for the sick child to call at school for his bottle of milk or for it to be taken to the child's home. He would inquire into the question of providing milk for school children who were in hospital.

The Bishop of Winchester then withdrew his motion.

Rheumatism Clinics for Insured Persons

On July 4 Mr. JOHNSTON asked the Secretary of State for Scotland whether his attention had been drawn to the high incidence of incapacitating rheumatism among the insured population in the industrial belt in Scotland, and whether the insurance committee for Stirlingshire had submitted their proposals to him for the inauguration of clinics for the treatment of rheumatism on lines similar to the clinics now operating in London. Colonel COLVILLE said he had received a resolution on this subject from the Stirlingshire Insurance Committee. He understood that the London clinics referred to had been set up by voluntary agencies. There were already certain voluntary institutions in Scotland which provided facilities for the treatment of rheumatism, and to which payments were made by approved societies out of surplus funds. He was prepared to encourage approved societies to contribute to the funds of any new clinics which might be established.

Annual Total Expenditure of Hospitals

On July 4 Dr. ELLIOT informed Mr. Rhys Davies that there were only two State hospitals—namely, institutions for mental defectives—under his control, the expenditure on them in 1937–8 being £80,047. In 1938 the total number of hospitals owned by local authorities in England and Wales, including sanatoria, maternity homes, mental hospitals, and institutions for mental defectives, was 1,432. The approximate expenditure thereon in the year ended March 31, 1937, the latest year for which figures were available, was £25,631,000, including £1,932,594 for loan charges in respect of capital expenditure. In 1937 the number of voluntary hospitals in England and Wales, including sanatoria and mental hospitals, was 984, but he had no information as to the total annual expenditure.

Road Accidents

Explaining the Vote for the Ministry of Transport and the Roads Vote in the House of Commons on July 5, Captain EUAN WALLACE said the road casualty list ran to 6,648 killed and 226,711 injured during 1938, but the persons killed in road accidents in 1938 were slightly fewer than the number killed in 1929, despite an increase of 40 per cent. in the number of road vehicles. Analysis of some 200,000 accidents involving death or personal injury in the year ended March, 1937, attributed 90 per cent. of these accidents to what was described as the human factor. In recent years attention had been paid by education authorities to training school children in road sense and road conduct, and the deaths due to road transport among children under 15 years of age dropped by one-third in the years from 1930 to 1937.

A proposal to reduce the vote was defeated.

Doctors' Duties in War Time

Replying on July 13 to Mr. Henderson Stewart, Dr. ELLIOT said that the Group Officers for the ten sectors into which the London area had been divided were in touch with the medical staffs of the hospitals with regard to the duties of individual doctors in war time, and medical officers of health were giving necessary instructions to the practitioners who had been allocated to first-aid posts. The Central Emergency Committee of the British Medical Association was keeping under review the position of medical practitioners not covered by these categories.

Mr. STEWART, in a supplementary question, asserted that the general practitioner in a vulnerable area like Battersea had no knowledge what plans were proposed in emergency and no idea what he was supposed to do.

Dr. ELLIOT replied that the Government kept in touch with medical practitioners through the British Medical Association.

Miss RATHBONE suggested on July 13 that courses of first-aid and war-time surgery should be provided for medical practitioners whose practice did not include such surgical experience. Dr. ELLIOT's reply was that the eminent medical men acting as Group Officers in the various areas, most of whom had much war-time experience, were selecting doctors with adequate surgical experience for duty in casualty receiving hospitals. He doubted whether Miss Rathbone's suggestion would be of use. Miss RATHBONE retorted that her proposal was supported by many medical practitioners who felt they had so little surgical experience that they would be at a disadvantage in war, even for first-aid work.

Recommendations of Committee on Nursing Services

Mr. AMMON inquired on July 13 what action was proposed on the recommendations in the report of the Interdepartmental Committee on the Nursing Services, including the question of superannuation and the transfer of superannuation rights. Dr. ELLIOT said that with regard to training and education he had already approved amendments by the General Nursing Council of the rules governing the preliminary examination in accordance with the committee's recommendations. These amendments had taken effect. The Board of Education would issue a circular on training courses. Dr. Elliot himself would shortly issue a circular to local authorities on various recommendations of the committee with regard to general conditions of service. Superannuation, with some other questions, was still under review.

Ophthalmic Surgeons and Medical Boards.—Each medical Board examining recruits for the militia has been given the names of one or more qualified ophthalmologists to whom they can refer men for examination where they consider this to be necessary. The number of instances is not sufficient to justify full-time officers being appointed.

School of Medicine in Nigeria.—Mr. MALCOLM MACDONALD states that a School of Medicine has been established in Nigeria for a number of years and is making good progress. The future development of higher education, including medical education, in West Africa is to be discussed at the conference of West African Governors which is to be held in August.

Notes in Brief

Of applicants for enlistment in the Regular Army from October 1, 1938, to May 31, 1939, who underwent medical examination, 12.447 per cent. were rejected.

Dr. Elliot hopes to publish the annual report of the Ministry for the year ended March 31, 1939, before the end of August, and the report of the chief medical officer for the year 1938 before the end of October.

Estimates of the future population of Great Britain have recently been prepared by the Registrars-General and submitted to the Royal Commission on the Distribution of the Industrial Population, accompanied by a full statement of the assumptions adopted. This evidence will be published.

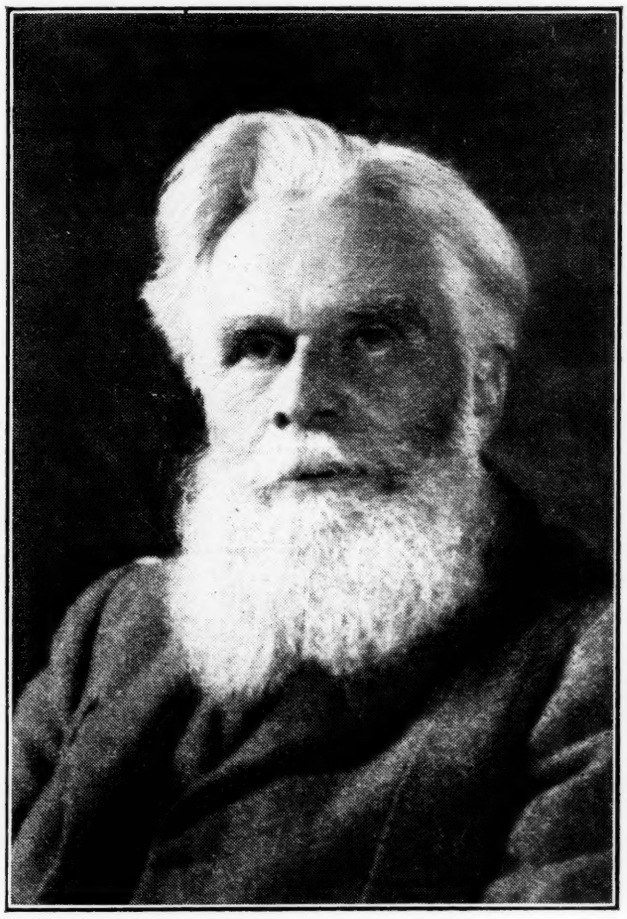
No age limit has been fixed beyond which university students will not be allowed to postpone their obligation to undergo military training under the Military Training Act.

The amount paid from the Exchequer towards the cost of national health insurance in Great Britain in the year ended December 31, 1938, was £6,706,000. This does not include the cost of central administration of the scheme, which is wholly borne by the Exchequer.

Obituary

HAVELOCK ELLIS, F.R.C.P.

Havelock Ellis first attracted attention in the medical and scientific world by his editorship of the Contemporary Science Series. What extraordinarily interesting books they were! Looking at the list to-day one can realize the influence they exerted in the last decade of the nineteenth century. Some of them have become classics, such as Bland-Sutton's *Evolution and Disease*, Karl Pearson's *Grammar of Science*, and Weismann's *Germ Plasm*. It is significant of Havelock Ellis's special trend that the first of the series was Geddes and Thomson's *Evolution of Sex*, a fascinating biological study, while the twenty-fourth was his own book *Man and Woman: A Study of Human Secondary Sexual Characters*. In the preface he tells us that it was based upon twelve years' collection of data concerning the constitutional differences between men and women; he had undertaken this not only because he felt it lay at the root of many social questions in which he was deeply interested but also because of the reckless or prejudiced statements widely current in popular literature. As he admitted, a good deal of the work relates to what might be called tertiary sexual characters, ranging from differences in metabolism, sensation, intellect, artistic impulses to variational tendencies and psychopathology. It can well be imagined that in 1894 such a book produced a great impression, as the writer can testify. It was a pioneer work, and marked the end of a conspiracy of silence. Geddes and Thomson by their biological approach had paved the way to a more rational attitude, but naturally that had not the same widespread appeal. True, Tennyson had sung some years before that woman was "not undeveloped man, but diverse," yet it was left to Havelock Ellis to point the moral by providing a scientific demonstration. The spirit in which he approached the subject is indicated in the general preface to his next work, *Studies in the Psychology of Sex* (1897), wherein he said, "we can never learn to reverence life until we know how to understand sex." He planned a series of seven volumes, and it proved unfortunate that the second of them was the earliest to be published, since it dealt with sexual inversion and included an essay by John Addington Symonds. Particularly unfortunate, as this was only two years after the notorious trial of Oscar Wilde. The police pounced on a bookseller, George Bedborough, for selling it, maintaining that it was obscene. In certain circles Aristotle is regarded as obscene, and many medical and scientific works might come under a similar ban. Naturally this was very perturbing to the literary and scientific world; a representative committee was formed and a substantial sum raised for defence. But when the trial opened at the Old Bailey Bedborough's courage failed and he pleaded guilty. This was most unfortunate, for Ellis had no *locus standi* in court, since he was not made a defendant, and so was unable to make any reply to the grossly offensive remarks that the Recorder saw fit to make about his character and motives. Naturally he was deeply wounded, considering how high were his motives and how sensitive his character. A still more serious consequence was that it was impossible for the publication of the series to continue in this country, though it was eventually published in Philadelphia. This disgraceful hounding of a man whose only offence was to be ahead of his times put Great Britain out of the running in scientific advance in the study of sex for a good many years.



One might say that it was not until the psychoneuroses of the war broke down the materialistic attitude of medicine that in this country there was much real attempt to bring human sex psychology within the scope of science. The clumsy heel of the law can be held responsible for crushing a promising growth. But though others might have been deterred, Havelock Ellis was not. "My path has long been marked out," he said after the trial; "I may be forced to pursue it under unfavourable conditions, but I do not intend that any consideration shall induce me to swerve from it." He won through, for the scientific study of sex is nowadays accepted almost without question, and, as the appreciation in a recent number of the *Archives of Neurology and Psychiatry* truly said, "His seven monumental volumes have probably served more than any other single work to bring sex out of the atmosphere of ignorance and prudery into the clear light of science, and will always remain an incomparable digest of the scientific knowledge of the subject up to contemporary times."

This is not the place to speak of his other literary activities, considerable though they were. He will remain in the memory of men as a singularly high-moulded soul, filled with a vivid sense of the beauty of the world and of the potential beauty of human life in it. His magnificent head and striking appearance harmonized with his character. Yet he was shy and retiring, caring little for material possessions. It was a great satisfaction to his

admirers when the Royal College of Physicians elected him to their Fellowship under the special rule in 1936. To one admirer at least the last recollection will be his shy and hasty exit from the Comitia after his admission, to avoid the congratulations of his friends. It was so characteristic of that shrinking from publicity, whether hostile or friendly, which marked his long and fruitful life.

W. L.-B.

[The photograph reproduced is by Lafayette, Ltd.]

Dr. JAMES RAFFAN died on June 28 at Gledholt Hall, Huddersfield, at the age of 54. Formerly head of the radiological department of the Huddersfield Royal Infirmary, he was for some months last year its senior honorary surgeon. From a very small beginning that department developed under his charge into the important part of the Infirmary's work that it is to-day. Dr. Raffan was a native of Aberdeen, and studied medicine at the University, graduating M.B., Ch.B. in 1906, and M.D. in 1909. Before settling at Huddersfield he was house-surgeon and house-physician at the Aberdeen Royal Infirmary, and spent some years in general practice at Brechin. During the war he served with the temporary rank of captain R.A.M.C. as surgical specialist to No. 39 Casualty Clearing Station and No. 88 General Hospital. At Gallipoli he was with the hospital ship *Aberdonian*, and later served with a field ambulance attached to the 29th Division on the Somme. He took the F.R.C.S.Ed. in 1909 and the D.M.R.E. of Cambridge in 1926. In addition to his appointments at the Huddersfield Royal Infirmary he was consulting radiologist to the Mirfield Memorial Hospital and consulting surgeon to the Holme Valley Memorial Hospital. W. H. S. writes: James Raffan had a very lovable personality and was very widely esteemed, both by his professional colleagues and by a wide circle of friends, and his affection for radiology was only equalled by his love of gardening; he could conjure out of the heavy soil of the West Riding of Yorkshire such blooms as were thought to be impossible of cultivation, and his fondness for an Allan Richardson was a delight to hear; it reminded one of Dean Hole. He was a lifelong member of the British Medical Association, and served as chairman of the local Division some years ago; he was a representative for three years—at Bradford, Nottingham, and Edinburgh—and for many years had been on the council of the Yorkshire Branch of the Association. A position which he only relinquished shortly before his death was that of local emergency officer, and he attended a meeting of the Local Emergency Committee as recently as last April; he had the fullest confidence of all his colleagues in this arduous position, and it was a matter of great regret when illness compelled him to resign. As an old Aberdonian he had naturally been appointed to represent the Huddersfield Division at the meeting of the Association this month, and was keenly looking forward to the visit, which has been cut short in so untimely a manner. Huddersfield mourns a prominent citizen, a professional man of many-sided activities—he was president-elect of the Yorkshire Society of Aberdeen Graduates at the time of his death—and a friend whose loss is irreparable. Ave atque vale.

Dr. WILLIAM MUIR CRAWFORD WATSON died on June 27 at the age of 72. He had practised in Harrogate from the beginning of the century until his retirement eight years ago, and by his death Harrogate Spa loses one of its best-known and most kindly figures. Born in Edinburgh in 1867, he studied medicine at the University and graduated M.B., C.M. in 1888, proceeding to the M.D. in 1892, after serving as house-surgeon at the North Lonsdale Hospital. Among his professional appointments were those of honorary medical officer to the Northern Police Orphanage and to the Rawson Convalescent Home, and consulting physician to the Furness Auxiliary Hospital. He had many other interests in Harrogate, the chief of which were at Bilton Parish Church, where he was vicar's warden, and the local branch of the Y.M.C.A., of which he had been president. From 1922 to 1924 he was a member of the Harrogate Town Council. Dr. Watson joined the local Division of the British Medical Association in 1896 and was vice-president of the Section of Dermatology at the Annual Meeting of the Association in 1924 at Bradford; he was also past-president of the Harrogate Medical Society, the Leeds and West Riding Medico-Chirurgical Society, and the Bradford Medico-Chirurgical Society. His wife died some years ago and there is no family.

Dr. PATRICK FRANCIS O'HAGAN, who died on July 5 at the age of 78, had practised in Croydon for over forty years. A native of County Longford, he was educated at St. Mels' College and the Ledwich School, Dublin. He then left Ireland to continue medical studies at University College, Liverpool, and obtained the L.R.C.P. and L.R.C.S. Ed. diplomas and the L.R.F.P.S.Glas. in 1889, returning to Dublin as resident assistant at the Coombe Maternity Hospital. He helped his brother in Liverpool for a short time, and then settled in practice in Croydon, where he held the posts of public vaccinator for the No. 4 District and certifying surgeon under the Workmen's Compensation Act. Dr. O'Hagan had been a member of the Croydon Division of the British Medical Association since 1893.

Dr. JOSEPH HENRY PHILPOT, who died in his eighty-ninth year at Campden Hill Square, W., was at one time well known in London medical circles. The younger son of the Rev. J. C. Philpot, he was born at Stamford on July 14, 1850, and from Stamford Grammar School went on to King's College School, London, and thence to King's College. At King's College Hospital he won three scholarships, two prizes, and a medal. In 1872 he took the M.R.C.S. and graduated M.B.Lond. with honours, proceeding to the M.D. in 1875 and the M.R.C.P. in 1886. He was house-physician at King's in 1872–3, and was awarded a prize by the King's College Medical Society for the best essay read during the session. In 1873 he was Radcliffe Student at Oxford; he returned to King's in the following year as subdean and medical tutor, and from 1881 to 1889 held the post of out-patient physician at the Victoria Hospital for Children. Dr. Philpot edited for two years the *Medical Times*, and published several books on non-medical subjects under the pen-name of Philip Lafargue. During the war he was chairman of a Belgian war refugees dispensary, and received the Médaille du roi Albert and the M.B.E. He had been a member of the British Medical Association for fifty-eight years.

Dr. EDWARD BASS RECKITT, latterly of Hatch End, died at his residence there on July 8, at the age of 87. Born at Hull in 1851, the son of Dr. Edward Reckitt, he received his medical education at Leeds and Edinburgh. In 1876 he qualified L.R.C.P., L.R.C.S.Ed., and graduated M.D. of St. Andrews in 1894. He practised in Boston for some years, holding the appointment of surgeon to Boston Hospital. He then removed to Bishops Stortford, where he was anaesthetist to the hospital and held other public posts. He devoted much time to military medicine, and ultimately was awarded the Volunteer Decoration. During the war he served with the 1st North Midland Brigade of the Royal Field Artillery, and held the commission of lieutenant-colonel R.A.M.C.T. He was a member of the West London Medico-Chirurgical Society, and joined the British Medical Association in 1878, remaining a member for more than forty years. After retiring from medical practice he resided in Hatch End, and his funeral service was conducted in St. Anselm's Church there and St. Albans.

Dr. FRANK H. MCMECHAN, founder of the *Journal on Current Researches in Anesthesia and Analgesia* and editor of the *Journal of the International Anaesthesic Research Society*, died at Cleveland, Ohio, on June 29, aged 60. For many years he had been crippled with arthritis.

Universities and Colleges

UNIVERSITY OF OXFORD

The following medical degrees were conferred in Congregation on July 15:

D.M.—W. H. Brown, R. McDonald.

B.M.—W. A. H. Stevenson, G. Theophilus, R. T. Warren, J. F. Bourdillon, G. J. Walley, G. Ashforth, E. S. Elliott, R. M. Lattey, T. Sutton Coulson, G. D. Walker, J. N. Mills, J. W. B. Douglas, G. K. McGowan, J. A. L. Leeming, J. T. Burrowes, E. S. Nicholson, F. Fulton, J. W. Ashley, N. F. E. Burrows, S. J. S. Hughes, S. F. Taylor, M. M. Pickles.

UNIVERSITY OF CAMBRIDGE

At Peterhouse, Cambridge, a scholarship of the annual value of £100 or £60 is offered, which is restricted to candidates who intend to study medicine. The scholarship is open for competition (in addition to a number of open scholarships and exhibitions) by an examination to be held in December, and may be awarded for proficiency in mathematics, classics, natural sciences, or history. Particulars may be obtained from the Tutor, Peterhouse, Cambridge.

UNIVERSITY OF LONDON

Brown Animal Sanatory Institution

The Report of the Brown Institution Committee for 1938 records that the superintendent has continued his researches on viruses, and in addition some experiments have also been carried out on the exceedingly minute filter-passing organisms which were described from the Brown Institution during the investigation on influenza. Dr. Nathan Raw has continued his researches on the production of non-virulent strains of human and bovine tubercle bacilli. Four lectures on the position of viruses in the organic world were delivered in December, 1938, as required under the will of the founder. During the year 933 cases were treated as out-patients, and the number of operations performed was 195.

Graham Fund

The annual report of the Graham Legacy Committee for 1938–9 states that the general purpose for which the Graham Fund was founded was to aid research in the school of advanced medical studies connected with University College Hospital. Mr. C. H. Gray resigned the Graham Scholarship on October 1, 1938, on appointment as biochemist to King's College Hospital, and Dr. R. M. Calder was appointed Graham Scholar from November 1, 1938. Dr. Calder is engaged on a histological study of the growth of splenic grafts, and is also investigating the relation of diet to liver degeneration induced by toxic substances. Dr. C. Bolton, Professor G. R. Cameron, Dr. L. E. Glynn, Dr. M. Maizels, and Mr. F. H. Teale have received grants in aid of research from the fund.

Professor C. R. Harington, F.R.S., was appointed Director of Research under the Charles Graham Medical Research Scheme for one year from October 1, 1938.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE

The following candidates have been approved at the examinations indicated:

ACADEMIC POSTGRADUATE DIPLOMA IN PUBLIC HEALTH.—T. K. Abbott (not eligible to receive the diploma until December, 1939), Rosetta C. Barker, Lily Bennett, Margaret Brodigan, H. B. C. Carter-Locke, J. Clark, C. S. Davies, D. O. Dickie, Jean Duncan Whyte, R. W. Elliott, C. N. Faith, Margaret A. B. Fleming, May E. M. Fleming, J. F. Houlihan, E. C. H. Huddy, J. H. Lawrence, H. A. Leggett, V. N. Leyshon, F. D. M. Livingstone, Jean J. Macdonald, J. P. McGladdery, R. W. Markham, Isobel M. S. Marshall, T. G. Martin, *E. L. M. Millar, Anil Mukerji, Dorothea M. Norman-Jones, M. N. Pai, P. Pau, M. M. Sircar, G. R. Taylor, *R. C. Wofinden, Grace E. Woods, Rowena Woolf.

ACADEMIC POSTGRADUATE DIPLOMA IN BACTERIOLOGY.—H. L. Carruthers, W. J. Godden, D. F. Gray, G. J. G. King, I. MacKay, C. D. Parker, *M. T. Parker, Y. S. Rao, Marion Ross, L. B. E. Seneviratne.

* Awarded a mark of distinction.

LONDON HOSPITAL MEDICAL COLLEGE

The Price University Entrance Scholarship, of the value of £100, has been awarded by the College Board to J. B. Stanton of St. John's College, Cambridge, and M. Evnine of New College, Oxford (equal, prize divided), for the academic year 1939–40.

LONDON (ROYAL FREE HOSPITAL) SCHOOL OF MEDICINE FOR WOMEN

The following scholarships have been awarded for 1939–40:

St. Dunstan's Exhibition: J. F. Tucker. *Mrs. George M. Smith Scholarships (Special):* D. A. Chapman and M. J. Flach. *A. M. Bird Entrance Scholarship:* P. H. Eversleigh. *Mabel Sharman Crawford Scholarship and Special Mrs. George M. Smith Scholarship:* N. Hewitson.

MacIntyre Evans Scholarship: D. A. Pullen. *Dr. Margaret Todd Scholarship:* E. E. Simpson. *Sarah Holborn Scholarship:* Q. M. F. Adams. *Fanny Butler Scholarship:* Dr. M. Weigert. *Extra:* A. M. Gray. *A. M. Bird Clinical Scholarship:* V. J. McMullen. *Alfred Langton Scholarship:* I. Hewitt. *Ellen Walker Bursary:* B. D. Owens. *Flora Murray Bursary:* I. G. Little. *Emma Beilby Bursaries:* I. S. Chalmers and J. M. Holtzmann. *A. M. Bird Postgraduate Scholarship in Pathology:* Dr. A. U. Fraser. *Mabel Webb and A. M. Bird Research Scholarship:* Mrs. A. M. Stewart, M.D., B.Ch., M.R.C.P.

UNIVERSITY COLLEGE

The following awards have been made at University College in the Faculty of Medical Sciences:

Andrews Entrance Scholarship, P. J. Hare. *Bucknill Entrance Scholarship,* Audrey Palmer. *Epsom Entrance Scholarship,* J. W. T. Dixon. *Medical Entrance Exhibitions,* Patricia M. Lloyd, R. H. Shephard. *Medical Entrance Scholarship,* I. R. Gray. *Cluff Memorial Prize,* Annette G. Cade. *Anatomy:* Senior Course, Gold Medal, Joyce A. Davies. *Embryology:* Percy F. Macgregor Research Scholarship, P. Ford. *Practical Anatomy:* Suckling Memorial Prize, Eva M. Graves. *Physiology:* Senior Course, Gold Medal, J. M. Wilson; B.Sc. Scholarships, Elinor H. Cleminson, H. B. Wright; Sharpey Scholarship, J. P. Quilliam; Bayliss-Starling Scholarship, R. R. Ridgeway.

The Combined Hospitals (St. Bartholomew's, Guy's, and St. Thomas's) announce the award of University entrance scholarships as follows:

St. Bartholomew's Hospital Medical College.—C. G. Phillips, Magdalen College, Oxford, scholarship; H. J. C. J. L'Etang, St. John's College, Oxford, exhibition, £60.

Guy's Hospital Medical School.—B. Ackner, Clare College, Cambridge, scholarship; D. L. Mollin, University College, Wales, exhibition, £60.

St. Thomas's Hospital Medical School.—C. O. Carter, Queen's College, Oxford, scholarship; J. F. P. Skrimshire, Clare College, Cambridge, exhibition, £60.

The following candidates have been approved at the examination indicated:

ACADEMIC POSTGRADUATE DIPLOMA IN MEDICAL RADIOLOGY.—G. W. Boden, M. L. Mundy, M. Nasiruddin, Peggy C. Permain.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

At a quarterly meeting of the Council, held on July 13, Mr. Hugh Lett was re-elected President, and Sir Robert Kelly and Sir James Walton were elected Vice-Presidents, for the ensuing year. Sir James Walton was readmitted and Mr. R. J. Willan and Mr. Cecil Joll were admitted to the Council.

Dr. Donald Balfour of the Mayo Foundation, New York, and Professor Peter Bull of Oslo were admitted as Honorary Fellows.

The John Tomes Prize was presented to Mr. Arthur Bulleid; the Hallett Prize, granted on the result of the Primary Examination for the Fellowship, was awarded to Mr. William Martin Beattie of Liverpool and Cambridge; and the tenth Macloghlin Scholarship for medical students was awarded to Mr. Ronald Henry Gorrill of Torquay Grammar School.

Lecturers

The following lecturers were appointed for the ensuing year:

Hunterian Professors.—Mr. S. A. Henry, one lecture on Cancer of the Scrotum in Relation to Occupation; Mr. C. P. G. Wakeley, one lecture on the Treatment of Certain Types of External Herniae; Mr. Digby Chamberlain, one lecture on the Treatment of Stone in the Common Bile Duct; Mr. A. R. Mowlem, one lecture on the Use and Behaviour of Cartilage and Bone Transplants; Mr. H. Taylor, one lecture on the Clinical Evaluation of Gastroscopy; Mr. E. C. B. Butler, one lecture on Some Observations on the Treatment, Complications, and Late Results of Acute Haematogenous Osteomyelitis, based on a Study of Five Hundred Cases admitted to the London Hospital during the years 1919–37 inclusive; Mr. A. H. McIndoe, one lecture on Inlay Grafting; Mr. T. F. Todd, one lecture on the Urological Complications of Carcinoma of the Cervix; Mr. D. Ll. Griffiths, one lecture on Volkmann's Ischaemic Contracture; Mr. F. F. Rundle, one lecture on the Pathogenesis of Thyrotoxicosis—Clinical Aspects; Mr. K. C. Eden, one lecture on Dumb-bell Tumours

and Neuro-fibromatosis of the Spine, with Special Reference to Bone Changes; Mr. F. H. Mills, one lecture on the Pathogenesis of Thyrotoxicosis—Experimental Aspects.

Arris and Gale Lecturers.—Dr. John Beattie, two lectures on subjects relating to human anatomy and physiology; Mr. M. W. C. Oldfield, one lecture on the Anatomy and Physiology of Speech.

Erasmus Wilson Demonstrators.—Mr. R. Davies-Colley, one demonstration, and Mr. L. W. Proger, five demonstrations, on the pathological contents of the Museum.

Arnott Demonstrator.—Mr. A. J. E. Cave, six demonstrations on the contents of the Museum.

Appointments

The following reappointments for the ensuing year were approved:

Mr. L. W. Proger, Pathological Curator of the Museum; Sir Frank Colyer, Honorary Curator of the Odontological Collection (on the nomination of the Royal Society of Medicine); Mr. C. J. S. Thompson, Honorary Curator of the Historical Collection.

Mr. Frank Harland Mills, F.R.C.S. (Sydney), was appointed a Leverhulme Scholar for three months.

Professor G. Grey Turner was appointed as the representative of the College on the Council of King's College, Newcastle.

The following Assessors were appointed for the Primary Fellowship Examinations to be held in India and Egypt in 1940:

India: Professor M. A. H. Siddiqi, F.R.C.S. (Anatomy); Lieutenant-Colonel H. S. Anand, I.M.S. (Physiology).

Egypt: Professor Douglas E. Derry, M.B. (Anatomy); Professor G. Von Anrep, M.D. (Physiology); Dr. Boris Boulgakov (Superintendent of Dissections).

Diplomas

Diplomas of Fellowship were granted to the following:

John Roscoe Dickinson (Cambridge and Guy's), Guy Harrison Baines (Cambridge and St. Thomas's), Francis Joseph Cahill (Melbourne), Francis Edgar Stock (King's College), Yadav Mahadeo Subhedar (Bombay).

A diploma of Membership was granted to Peter Walter Willison Gifford of Birmingham.

Diplomas were granted jointly with the Royal College of Physicians of London as follows:

DIPLOMA IN PUBLIC HEALTH.—L. A. Collins, E. A. Hardy, H. B. Hodson, S. B. Karani, S. A. Maclean, Margaret M. Meikle, J. Morana, Kathleen M. N. Vickers.

DIPLOMA IN PSYCHOLOGICAL MEDICINE.—Rosie B. Becker, F. A. Bleaden, N. Copeland, W. A. S. Falla, S. W. Gillman, F. P. Haldane, F. E. S. Hatfield, J. A. Herd, J. H. Hurt, H. A. C. Mason, Elizabeth H. Rosenberg, C. A. Rumball, J. P. Spillane, Joyce M. Stephen, G. T. Stockings, F. J. E. Stuhl, S. Le R. Switzer, J. A. Walters, Fanny D. Wride.

DIPLOMA IN LARYNGOLOGY AND OTOLOGY.—O. I. E. De Sousa, T. P. Hardie Neil, S. W. G. Hargrove, J. F. Jarvis, F. J. Kritzinger, En Fo Lai, K. G. Rotter, A. S. Shereen, J. Singh, T. P. N. Sinha.

Medical News

The Left Book Club Medical Group was started six months ago and has been meeting regularly ever since. At the first meeting Dr. Harold Balme spoke on medical work in China. As a result of this talk the problem of medical aid was raised. At a meeting to be held on Friday, July 28, at 8.30 p.m., at the University Labour Club, 15, Percy Street, W.C.1, Dr. Baer will speak on conditions in the refugee camps in France, Professor P. C. Chang on conditions in China to-day, and Dr. M. L. Gilchrist on the work of the China Medical Aid Committee. An appeal will be made for funds, which will be used for the equipment of doctors who are going to China. The next regular meeting of the club will be held at the University Labour Club on Thursday, August 3, at 8.30 p.m., when Miss Barbara Low will open a discussion on "The Psychology of Propaganda." The committee has decided to make a charge of 6d. admission at this and future meetings to cover expenses.

The next meeting of the German Dermatological Society will be held at Breslau from August 16 to 18, under the presidency of Professor Zieler of Würzburg.

The *Dermatologische Zeitschrift*, founded in 1897, is being continued under the name *Dermatologica* (*International Journal of Dermatology*).

The second International Congress for the Investigation of Biological Rhythm will be held at Utrecht on August 25 and 26. Further information can be obtained from Dr. F. Gerritzen, Lunteren, Holland.

The third All-India Obstetrics and Gynaecological Congress will be held at Calcutta in December. The principal subjects for discussion are anaemia of pregnancy, functional uterine haemorrhage, and maternity and child welfare. The provisional scientific committee of the congress has formulated a scheme to facilitate investigation in these subjects, and full particulars may be obtained from the secretary of the committee, Dr. S. Mitra, 3, Chowringhee Terrace, Calcutta.

The twelfth International Congress of the History of Medicine will be held in Berlin from September 22 to 28, 1940. The chief subjects for discussion are the evolution of medicine from Harvey to Haller, introduced by Dr. Laignel Lavastine, professor of the history of medicine in the Paris Faculty, and the history of typhus, introduced by Professor Zeiss, director of the Institute of Hygiene at the University of Berlin.

King Boris of Bulgaria has been made an honorary doctor of medicine of Sofia University on the occasion of the fiftieth anniversary of its foundation.

The Advisory Committee of the Leverhulme Research Fellowships has awarded a Fellowship to Mr. D. Ll. Griffiths, F.R.C.S., clinical assistant in the orthopaedic department of Manchester Royal Infirmary, for his work on the comparison of radiological and histological features in bone tumours. Information concerning the fellowships may be obtained from the secretary, Leverhulme Research Fellowships, Union House, St. Martin's-le-Grand, E.C.1.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

During the week a very slight increase in the notifications of diphtheria in England and Wales was recorded; the figure is exactly the same as the median value for the last nine years, but is well below that of the same week of 1938. On the other hand, scarlet fever continues to increase in England and Wales. High figures were recorded for London 203 (166), Battersea 10 (13), Islington 19 (12), Hackney 14 (11), Lewisham 16 (8), Woolwich 16 (13), Stepney 22 (14), Wandsworth 26 (28), Hendon 14 (8), Tottenham 16 (5), Ealing 10 (8), Edmonton 10 (5); Birkenhead 10 (10), Derby County Borough 13 (15), Dagenham 12 (6), East Ham 10 (5), Bristol 21 (21), Liverpool 64 (58), Manchester 50 (40), St. Helens 21 (15), Leicester 10 (6), Stoke-on-Trent 21 (30), Wolverhampton 28 (19), Birmingham 32 (34), Coventry 27 (15), Kingston-upon-Hull 16 (11), Cardiff 14 (24), and Pontardawe, Glamorgan, 10 (13). Figures in parentheses refer to cases notified in the previous week.

Thirty-two cases of enteric fever were recorded, compared with 30 in the previous week. The following were the centres chiefly affected: 2 each in Mexborough and Spenborough in West Riding of Yorkshire, 2 in Rhondda Urban District, and 1 in Pontypridd. Of the 3 London cases, one each occurred in Battersea, Wandsworth, and Westminster.

Cerebrospinal fever appears to be on the increase, the notifications for the last four weeks being 21, 20, 26, 32 (week under review). The largest number of notifications were recorded in Glamorgan 6 (Rhondda 3, Cardiff 1, Pontardawe 1, Llantrisant and Llantwitfardre 1), Monmouth 6 (1 each in Abergavenny, Abertillery, Bedwellty, Ebbw Vale, Risca, and Tredegar), Stafford 4 (Walsall 3, Stoke-on-Trent 1), and Warwick 3, all of which were in Birmingham.

In England and Wales 15 cases of poliomyelitis were notified, compared with 6 in the corresponding week last year, and in London the figures were 2 and 0 respectively. Notifications in the immediately preceding four weeks were 2, 15, 12, and 3; the corresponding figures for last year were 5, 0, 4, and 3. It would be unsafe to prophesy that the increase in notifications this year indicates that an epidemic of the same proportions should be expected.

No. 27

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended July 8, 1939.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for : *(a)* England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland. Median values for the last 9 years for (a) and (b).

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for : (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases ; a blank space denotes disease not notifiable or no return available.

Disease	1939					1938 (Corresponding Week)					1930-8 (Median Value Corresponding Weeks)	
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)	(a)	(b)
Cerebrospinal fever	32	1	9		—	18	3	8		1		
Deaths		1	—				1	2				
Diphtheria	892	102	160	36	8	1,001	127	151	49	21	892	143
Deaths	28	3	6	2	—	22	2	4	2	—		
Dysentery	42	7	24		—	51	23	40		—		
Deaths				—	—				—	—		
Encephalitis lethargica, acute	5	1	1		—	4	—	4	1	—		
Deaths		2					1					
Enteric (typhoid and paratyphoid) fever	32	3	5	3	—	13	2	6	5	4	50	
Deaths	1	—	—	3	—	—	—	—	—	—		
Erysipelas		28	48	4	1			59	2	5		
Deaths		1					2					
Infective enteritis or diarrhoea under 2 years												
Deaths	40	8	9	6	3	64	19	10	10	2		
Measles		45	50		6			91		7		
Deaths	7	—	—	1	—	7	3	1	—	1		
Ophthalmia neonatorum	91	11	29		1	113	9	26		—		
Deaths												
Pneumonia, influenzal*	452	29	6		7	500	42	5	1	16	533	42
Deaths (from influenza)	10	—	1	—	1	11	2	2	—	—		
Pneumonia, primary			137	5				139	8			
Deaths		5		8	7		15		8	6		
Polio-encephalitis, acute	1	—				1	—					
Deaths		—					—					
Poliomyelitis, acute	15	2	2		2	6	—	4		—		
Deaths		1					—					
Puerperal fever	6	6	16	3	—	5	5	17	3	—		
Deaths		—†					—					
Puerperal pyrexia	203	14	24		1	164	17	23		—		
Deaths												
Relapsing fever	1	—			—	—	—			—		
Deaths												
Scarlet fever	1,870	203	226	47	74	1,751	157	295	73	71	1,684	244
Deaths	—	—	—	—	—	2	—	2	—	—		
Small-pox	—	—	—		—	—	—	—		—		
Deaths	—	—		—	—	—	—		—	—		
Typhus fever	—	—	—	—	—	—	—		—	—		
Deaths				—	—				—	—		
Whooping-cough		241	51		15			29		8		
Deaths	10	2	2	—	1	3	1	5	2	1		
Deaths (0-1 year)	270	44	65	15	13	294	63	64	27	19		
Infant mortality rate (per 1,000 live births)	43	39				49	52					
Deaths (excluding stillbirths)	3,972	698	540	165	126	3,851	701	595	175	136		
Annual death rate (per 1,000 persons living)	9.7	9.0	10.9	11.1	11.1	9.5	8.9	12.1	11.8	12.1		
Live births	6,381	1,001	923	309	247	6,761	1,234	923	338	252		
Annual rate per 1,000 persons living	15.7	12.8	18.7	20.8	21.7	16.6	15.7	18.8	22.9	22.3		
Stillbirths	263	42	45			326	51					
Rate per 1,000 total births (including stillborn)	40	34	46			46	39					

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.
† Death from puerperal sepsis.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

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The TELEPHONE NUMBER of the British Medical Association and the *British Medical Journal* is EUSTON 2111.

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SECRETARY, *Medisecra Westcent, London.*

The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh;* telephone 24361 Edinburgh), and of the Office of the Cumann Doctúirí na h-Éireann (I.M.A. and B.M.A.), 18, Kildare Street, Dublin (telegrams: *Bacillus, Dublin;* telephone 62550 Dublin.)

QUERIES AND ANSWERS

Excessive Smoking

Dr. EDWARD PHILLIPS (Oxford) writes: If the patient in question were to smoke one of the herbal mixtures, at first mixed with half tobacco, then gradually reduced to herbs alone, he would find in a week the mixture might be smoked without any addition and the nicotine poisoning would be abolished. I am not speaking without chapter and verse, for I have adopted this plan myself with complete success, and many of my patients (ardent smokers) have done the same. A large cherry pipe is required for the purpose.

Income Tax

Income from Colonial Trust

"SIGMA" is a British subject resident (and we assume "ordinarily" resident) in this country. He has an income of about £100 per annum from his late father's estate in a Crown Colony. He has been under the impression that as no part of the income has so far been remitted to the United Kingdom he is not liable to income tax here. He asks for advice on one or two points which will be indicated by the reply below.

*** If the income is from stocks, shares, or rents it is liable to tax here on the amount arising abroad; otherwise, for example, if the income is of the nature of business profits it is not liable until it is remitted. In our opinion "Sigma" would be well advised to place the facts before the local inspector of taxes. If the liability comes to light before disclosure the nominal penalties would be heavy—treble duty on the *total* income as a maximum—and "Sigma" would probably be required to pay interest on the avoided payments and, say, £50 by way of penalty in addition to the tax assessable. If disclosure is made now it is thought that the Revenue would accept payment of the duty only.

Assistant Receiving Free Lodging

"H. J." is an assistant living in rooms which are provided for him by his principal. The inspector of taxes claims tax from him on the value of the accommodation provided, quoting as authority Nicoll *v.* Austin.

*** In his opening remarks the judge in that case pointed out that the question turned upon "rather special facts." Mr. Austin was the occupier of a residence and his company had agreed to pay certain annual expenses for him, including rates and light and heat, etc. In such circumstances the employer was making payment of sums due legally from the employee, and the court held that on the special facts tax was payable under Schedule E. But that is not the case where a principal makes himself liable for payment of sums for the accommodation of his assistant; the latter is not liable for the rent, and the payments made are not made legally on his account. The case of "H. J." apparently falls within the general rule laid down in Tenant *v.* Smith, and he is not liable to the tax demanded of him.

Cause of Fibrillation of Calf Muscles

Dr. "X." (Burma) writes: I am interested in a patient whose only physical sign is fibrillation of the calf muscles, and would be grateful to hear of other practitioners' experiences in regard to this phenomenon. The patient was to all intents fit and well, though perhaps somewhat run down, and suddenly noticed the twitchings of the muscles. He had previously felt some discomfort for a few days, but no pain, in the muscles. This was on July 2, and since then the twitching has been continuous. It is both visible and subjectively felt by the patient. There is no disability beyond a slight tendency to fatigue in the muscles concerned. On routine examination there are no signs of an upper or of a lower motor neurone lesion. There is no history of trauma or syphilis. The patient, a European of 39, has never had any serious illness. He has always suffered from a tendency to insomnia. The family history is clear. The diagnosis of a type of progressive muscular atrophy naturally comes to mind, but in the literature there are mentioned a number of causes of fibrillation of a comparatively trivial nature, such as fatigue, gastro-enteritis, etc. Chronic general fatigue is quite definitely a factor in the present case.

LETTERS, NOTES, ETC.

Treatment of Angioneurotic Oedema

Dr. B. KOUNINE (London, S.E.1) writes: In my practice I recently encountered a very persistent case of angioneurotic oedema in which I was struck by a syndrome suggesting some deficiency of the cortex of the adrenal gland. I subsequently decided to try cortin treatment, and I am able to report a striking improvement in the general health of the patient, as well as complete freedom from his previous angioneurotic symptoms. What made the improvement all the more striking was the fact that the patient was not restricted in any way as regards diet. Revolving in my mind several other cases of angioneurotic oedema which I had met in practice, I was inclined to think that we may well look to a deficiency in the suprarenal cortex as the probable underlying cause of this disease. Whether the injected cortin acts as a detoxicating factor or as one which prevents the formation of histamine-like products is a question which cannot yet be answered. Whatever the mode of action cortin seems to me a therapeutic agent well deserving a fair trial. Before the cortin treatment (2 c.cm. daily for four weeks) the acute and severe attacks of oedema responded well and promptly to a combination of novurit by injection and large doses of urea by the mouth (6 to 8 drachms a day).

M & B 693 in Meningitis

Dr. L. B. SHELTON (Surbiton, Surrey) writes: I was called out last April to see a baby, aged 11 months, suffering from vomiting and fits of one day's duration. The infant looked very ill and had a temperature of 103° F. There was some suspicion of early pneumonia. The throat was clear, and there was slight rigidity of the neck. The next day the temperature was 104° F., and signs of meningitis were more definite. There was vomiting, screaming, strong head retraction with a curved rigid spine, and a definite Kernig's sign. She was given M & B 693, half a tablet three-hourly, and by the following day the temperature was down to normal, though all other signs and symptoms still persisted. At this stage she was sent to hospital, where meningococcal meningitis was diagnosed, and the report on the cerebrospinal fluid was as follows: "A very turbid specimen; protein, 24 mg. per 100 c.cm.; globulin, marked excess; chlorides, 67 mg. per 100 c.cm.; films showed a few Gram-positive bacilli only; culture—no meningococci." M & B 693, half a tablet two-hourly, was given, and one injection of anti-meningococcal serum. She continued to progress well, and was discharged from hospital at the end of seven days.